Chapter 2

Review of literature

This chapter presents a critical examination of literature related to mindfulness practices. Mindfulness in its real sense is “being”, rather than “doing”. It is true that the current mainstream description of mindfulness derives its roots from Eastern meditative practices. However, it is a misconception to think that mindfulness is an equivalent term for an Eastern form of meditation. Meditation, especially insight-oriented meditation, is one among many other practices that are called mindfulness awareness practices (MAPs) which is aimed at cultivating a state of mindfulness. Furthermore, the concept of mindfulness can be considered closest to the Buddhist vipassana tradition. With this general guideline, this chapter of review of literature begins by attempting to evaluate mindfulness in the context of vipassana. Since the approach in this study used a method to cultivate mindfulness based on meditation, it is logical to present the definition of meditation and attempt to clarify the usage of the term. Then we will present a description of the philosophical roots of mindfulness meditation in Buddhist traditions and contemporary theories of mindfulness. Then the current status of literature on mindfulness along with its application will be discussed. Most importantly, this chapter focuses on mindfulness and its impact on affect and cognitive functioning.

Vipassana and mindfulness

Vipassana is considered to be one of the oldest meditation practices in Buddhist traditions, especially in Theravada Buddhism (Goenka & Hart, 2000). According to the
Pali language spoken by the Buddha, the word *vipassana* means “insight” or “awareness” (“*vipassana,*” n.d.). Therefore, *vipassana bhavana* is the Pali word for insight meditation. The term *bhavana* stems from the root word *bhu* which means “to become” or “to grow.” Hence, *bhavana* means “to cultivate”, especially in terms of the mind. Therefore *bhavana* implies mental cultivation (Mahathera, 1991). Similarly, the word *vipassana* consists of two roots, *vi* and *passana. Passana* means “to become bright” or “clear” (“*passana,*” n.d.). The prefix *vi* has different connotations, it can mean “in a very special way”, but it also denotes “into” and “through”. Thus, Mahathera (1991) explains that “the meaning of the whole word *vipassana* means looking into something with clarity and precision, seeing each component as distinct and separate and piercing all the way through, so as to perceive the most fundamental reality of that thing (p. 30).” So *vipassana bhavana* refers to the development of the mind in a special way leading to complete insight and comprehension, or, perception. The method is cited directly from *Satipatthana Sutta*, a document of discourses that is believed to contain the authentic teachings of Buddha himself (Silananda, n.d.). It provides comprehensive and practical instructions on *vipassana bhavana*, i.e., achieving insightful knowledge.

The Pali word *sati* or the Sanskrit word *smr̥ti* are the two terms almost equivalent to the English word ‘mindfulness’. However, *Sati* connotes three meanings – awareness, attention, and remembering beyond its literal meaning ‘to remember’. Brown and Ryan (2003) suggest that the terms awareness and attention are better understood under the broader umbrella of consciousness. Awareness is the site of this concept of consciousness and is concerned with continuously auditing the inner and outer environment like a
mental-radar. On the other hand, attention is a focusing of awareness, a conscious act involving intentionality that gives us an increased level of sensitivity to a certain range of experiences (Westen, 2003). Mindfulness is attending to prominent experiences in the current moment, here and now. By definition, mindfulness also includes memory. It is not the indulgence of a memory from the past, but rather remembering to bring back one’s wandering mind to the present, here-and-now experience. It is also important to remember that the word mindfulness can be used to imply different things, dependent upon the context. In general, the term mindfulness can be used in three ways; as a theoretical construct, a method or technique, and as a psychological mechanism of the mind and brain as a consequence of being mindful.

_Vipassana_ and mindfulness are considered to be equivalent terms and are often used interchangeably. However, the accurate usage of these terms is necessary to avoid confusion. A better way to distinguish these terms is to understand that _vipassana_ is achieved through mindfulness. It implies that, unless otherwise specified, when someone is using the term vipassana, they are likely to be referring to the process of cultivation of _vipassana_, i.e., the _vipassana bhavana_.

**Defining Meditation**

As was mentioned earlier, the word meditation has been used in different ways in varied contexts. Although it may not seem important, it is essential to understand and differentiate the phrase that any particular speaker uses. In the _Encyclopedia of Positive Psychology_, Shapiro (2009) refers to the term mindfulness as a family of conscious
methods to train attention applying non-analytical and non-discursive approaches. Almost every culture in the world employs some method or form of mental exercise, which may be referred to as meditation in general. However, the techniques of meditation vary depending on specific cultures and traditions. This review has not attempted to survey these varied methods. However, few traditions that are commonly practiced and found in the mainstream literature are discussed.

There are two primary meditation-type-methods within Judeo-Christian traditions, which overlap at times. One such method is called prayer, and other is contemplation. “Prayer is an act of addressing any spiritual entity in words or thoughts” (“Prayer,” n.d.), whereas contemplation is a prolonged conscious “act of thinking deeply of something” (“Contemplation,” n.d). The content of one’s thought during contemplation may contain a religious idea or a passage from the scriptures. Nonetheless, both these practices can be labeled as exercises in concentration (Mahathera, 1991). The practice of concentration, often referred to as one-pointedness of mind, involves the restriction of one’s thought processes to stay at one static point (Mahathera, 2015). Typically the results of such concentrative practices include a physiological slowing down of metabolic processes, deep calm, and a sense of peace and well-being (Mahathera, 1991).

Another set of meditation techniques, often referred to as Yogic meditation, are rooted in Hindu traditions and are purely concentrative in nature. The conventional Yogic meditation exercises involve focusing the mind on a specific object, for instance, the flame of a, and restricting the mind from wandering. The object of attention could vary
from complicated things such as chanting mantras, vivid religious images, channels of energy in the body, and so on, but the practice itself remains wholly an exercise in concentration.

Buddhist traditions include a unique and additional element of meditation, the element of awareness, in addition to exercises in concentration that are widely used in many cultures and traditions and are not restricted to Buddhism. The goal of all Buddhist traditions is to develop insight utilizing concentration as a tool (Hart, 2009). There are variations within Buddhist traditions resulting in diverse methods to achieve awareness. Zen meditation, one of the traditions within Buddhism, describes two separate routes to achieve awareness. The first way involves the force of a willful mind to direct awareness, where the person sits and tries to toss out everything except the pure awareness of sitting (Pagnoni & Cekic, 2007). The second route commonly used in the Rinzai school involves “tricking the mind out of conscious thought and into pure awareness” (Mahathera, 2015). On the other hand, Tantric Buddhism believes in obtaining awareness by defeating the ego and self-concept. The defeat of ego and self-concept is “the key to reaching transcendental understanding and the great vehicle of meditation is mandala” (Lieberman & Lieberman, 2003). It is usually consummated through the process of visualization and mental imagery.

Another distinct mind practice within Buddhist traditions is vipassana, considered the oldest of Buddhist meditation practices (Fleischman, 2009). Through the process of mindfulness, an individual can slowly develop self-awareness (Rāhula, 1997). The
concepts of mindfulness and *vipassana* will be discussed subsequently since this form of meditation practice is the area of investigation of this study. Although there may not be a consensus on this matter, it appears to be logical to divide the commonly used meditation techniques across cultures and traditions, into two broad categories: 1) concentration meditation and, 2) insight-oriented meditation (Mahathera, 1991). *Vipassana* and other Mindfulness practices come under insight-oriented meditation. A well-known Zen author James Austin (2010) calls insight meditation a receptive meditation that is characterized by an unfocused and inclusive nature.

**Theories and Philosophy of Mindfulness**

While reviewing the literature on theories and philosophies of mindfulness, it would be appropriate to look into its roots. This section of the review of literature first traces the review of literature based on Buddhist philosophy, and then presents the contemporary view.

**Buddhist psychology.** Mindfulness lies in the heart of Buddhist psychology. Buddha’s teachings form the basis of Buddhism, and it is practiced and followed as a faith and religion by many. Ideas from Buddhism are discussed and debated in Buddhist psychology. In comparison to Western science, including modern psychology that typically explores phenomena through objective and third-person observation, Buddhist psychology applies a systematic first-person approach relatively devoid of a priori assumptions (Wallace, 2009).
**The four noble truths.** Every belief system has its set of explanations of truth. The foundation of Buddha’s teachings revolves around the idea of four noble truths; 1) the truth of suffering, *dukkha sacca* in Pali, is that the human condition is inescapable from suffering, 2) the truth of the cause of suffering, *samudaya sacca*, is that the suffering is caused by the conflict between how things are and how we desire them to be, 3) the truth of ending suffering, *nirodha sacca*, is that the suffering can be reduced or even eliminated by changing our attitude towards experiences, and 4) the truth of path leading to the end of suffering, *magga sacca*, includes the prescription of eightfold path that can put the suffering to an end (Rāhula, 1997).

**The noble eightfold path.** After realizing that the two extreme methods of adopting either a haphazard or a physiologically rigorous practice, would not lead to enlightenment, the pure awareness or insight, Buddha followed the middle path and achieved enlightenment. He then prescribed an eightfold path leading to the cessation of suffering. The noble eightfold path includes, 1) right view and understanding, 2) right thought, 3) right speech, 4) right action, 5) right livelihood, 6) right effort, 7) right mindfulness, and 8) right concentration (Rāhula, 1997). These paths are not self-sufficient and are not in any order of precedence. The recommendation is that one follows the entire set of paths simultaneously. However, from a practical point of view the eightfold path is divided into three groups and are prescribed to be practiced in an order: 1) lifestyle and behavior, *sila* in Pali, includes right speech, right action and right livelihood, 2) concentration, *samadhi* in Pali, consist of right effort, right mindfulness,
and right concentration, and 3) awareness, *panna* in Pali, includes right understanding and right thought (Silananda, n.d.).

Right mindfulness is one among the eightfold path; however, right concentration is a prerequisite to obtaining right mindfulness, from the practical point of view. As a result, most insight-oriented meditations are practiced as the combination of focus and mindfulness (Ko Lay, 2002). The discussion of the entire eightfold path and its significance are not considered in this study. One can find any literature on Buddhism to obtain a better understanding of these concepts.

**Classical mindfulness training.** Individuals, while practicing mindfulness, purposefully and systematically direct their attention towards an object. Traditionally the focus has been on the four perceivable objects: body, feeling, mind, and mental objects (Analayo, 2013).

Breath is the starting point for drawing awareness towards the body (Hart, 2009). One carefully notices the various physical sensations arising due to the process of breath. The superficial sensations in the nose and abdomen are initially perceived. However, with practice the intensity of examination increases and one notices a myriad of subtle physical phenomena associated with it.

Next, attention is applied to different postures. Each bodily posture lends itself to a plethora of sensations that present themselves for scrutiny. One can bring mindfulness to even mundane actions such as walking, eating, or drinking, by drawing attention to the
dynamics of touch. Buddhists believe that one may delve deeper into the experience of touch by noticing the variation of temperature, resistance, and movement (Goenka & Hart, 2000).

The body can also be scanned mindfully, beginning from the head and moving down to the tip of the toes. Such scanning brings all unnoticed physical sensation before one’s mind. The aim of the bodily scrutiny in all these instances is to be merely aware of the outermost sensations without labeling them in any way.

On a secondary level, mindfulness is applied to feelings. Feelings and physical sensations are closely intertwined and with practice one can extrude feeling from the amalgamated experience. It is done to distinguish the touch of the bodily sensation from the pain associated with it. In ordinary perception, we are unable to delineate the experiences and thus perceive them to be a united whole. However, mindfulness is directed towards bringing this distinction.

Memory, thoughts, and images are mental objects that are also accompanied by shades of undistinguished feelings. The first step for the practitioner is to arrive at a state where he or she could identify the feeling tone distinctively. This preliminary step helps one understand the nature of the mind, which in turn provides further insight into its restless vagaries.

The third level of introspection is to scrutinize the mind itself. The practitioner observes whether the level of his consciousness at that moment lends itself to any of the
states of inner disharmony. Greed and hatred are two such states arising out of craving or aversion; both of which imply an intensity of movement towards a non-existent state. Delusion is another disharmonious state that allows the other two states of intensity to preside over the mind. Thus, the state of delusion is an inevitable background when ruled by the state of greed or hatred (Germer, Siegel, & Fulton, 2013).

When one is seated immobile for a long time and experiences pain, the pain is a result of opposition to the perceived sensory sensations. Thus, it is the opposition that creates pain and not the sensations themselves. The resistance can be translated as the dissatisfaction with an unpleasant context and the urge to change it. It can also be considered as the craving for pleasant sensations. Both these urges happen almost simultaneously bringing with it confusion. Mindfulness is about exploring these confusing physiological phenomena to bring clarity.

Deeper mindful states reveal the insight that both aversion and longing are manners in which the mind responds to external stimuli and that they are not very different from each other. This realization contributes to equanimity, where one is now no longer victimized by the oscillatory movements of the mind. Physically, this attitudinal shift manifests as a sigh, a deliberate relaxation of the body, and a deeper thrust to objectively examine phenomena without judgment.

In this way, one understands the gestalt of the mind and hence transcends the afflictions of desire, aversion, and confusion (Germer, Siegel, & Fulton, 2013). Mindfulness thus brings about a paradigm shift arising from objective evaluation and
concluding in an inner alchemy. The divide between pleasant and unpleasant, good and bad, dissolves as conceptual ideas gives way to an intuitive understanding. However, this analysis still pertains to the domain of phenomenology; higher cognitive understanding is yet to be awakened.

The fourth level of mindfulness is the attentive awareness applied to mental phenomena (Fleischman, 2009). At this level, one’s mind does not confine itself to merely gazing at the tides of physiological phenomena. With the aim to attain clarity of mind, Buddhist psychology identifies the five hindrances that prevent the attainment of such a state. These impediments may be implicitly present, absent, or still in the processing of rising. They are identified to be – sense, desire, aversion, indolence, restlessness and doubt. By deliberately distancing the practitioner becomes aware of a state of non-involvement. He or she further creates an intention to assume a non-participatory approach towards the phenomena, which prevents them from arising in the future. It in turn contributes to mental clarity. It is the focused awareness that unravels the construct of the desire and its dependency on stimuli perceived by the sensory apparatus.

Mental phenomena may also be the five aggregates of experience: feeling, perception, consciousness, materiality, and intentions (Germer, Siegel, & Fulton, 2013). Again mindfulness is brought to these unified experiences. In doing so, the tendency to acknowledge something as a unitary entity is questioned, and that questioning results in the deconstruction of one’s whole experience. By focussing attention on each thread of
experience, one begins to perceive it as a process of change and the artificial sense of unity is demolished.

The systematic application of mindfulness to varied phenomena helps us arrive at the six objects of sensory perceptions. The practitioner now focuses his awareness on both the internal as well as the external fields of sensory perception. He thus notices how desire is never isolated from the sensory apparatus but always arises from a sensory field. On noticing the dependency that the desire has towards a particular sense object, the practitioner deliberately renounces that dependency. It helps a person to transcend his or her state of attachment.

In mindfulness meditation, it is important to know the factors that facilitate wisdom. These factors known as the seven factors of awakening are; mindfulness, investigation of phenomena, energy, tranquillity, joy, equanimity, and concentration (Analayo, 2013). One merely observes the presence, absence or arising of these phenomena, non-judgmentally. A conscious effort supported by an intuitive acknowledgment of its beneficiaries is made to imbibe these qualities. These beneficiary states are inter-dependent and the acquisition of one often lead to another allied state. One exalts to a state of inner harmony and enthusiasm that is bliss beyond logistic reason. The joy that wells within is balanced by the bearings of peace. Thus, the mind is now in a state of passive alertness that can skilfully overcome the travails of desire and suffering.
**Mechanism of Mindfulness**

Various processes have been proposed to explain how mindfulness works based on both theoretical and empirical perspectives. Holzel, Lazar, Gard, Schuman-Olivier, Vago and Ott (2011) have identified six action-effect mechanisms of mindfulness with the help of neurological studies. These six mechanisms are; 1) attention regulation, that increases the stability of awareness despite competing input of stimuli, 2) body awareness, by enhancing the awareness of subtle sensations and emotions, 3) emotion regulation, that decreases reactivity, and disallows emotions to interfere with behavior or performances, 4) reappraisal, that reorients attitudes to see difficulties as meaningful or not as harmful, in contrast to seeing a situation as fully bad, 5) exposure, through global desensitization, to whatever is existing in one’s field of awareness, and 6) flexible sense of self, by increasing adaptivity and disidentification with emotions.

Another important neurobiological mechanism that occurs as an effect of mindfulness is that it deactivates or reduces the frequency of activity of the default mode network (DMN). It appears that even if one’s brain is at rest or when one seems to be resting, there are several midline regions of the brain that are active (Mason, Norton, Van Horn, Wegner, Grafton, & Macrae, 2007). According to Killingsworth and Gilbert (2010), the DMN is active during 46.9% of our wakeful lives including when one is meditating. The DMN gets activated mostly when the mind wanders, also known by Buddhists as a state of “monkey mind.” The activation of the DMN is instinctual with survival values. During this wandering period, the mind seems to be indulging in the past
and the future, trying to find some solutions to the problems, both real and imagined. The activity of the DMN has been found to be correlated with anxiety and depression (Broyd, Demanuele, Debener, Helps, James, & Sonuga-Barke, 2009) and deals with narrative processing. In contrast, mindfulness activates the structures of the brain such as frontal cortex that are associated with experiential processing (Farb, Segal, Mayberg, Bean, McKeon, Fatima, & Anderson, 2007). All forms of mindfulness practices help to decrease the frequency of DMN activation or change its functional connectivity (Taylor, Daneault, Grant, Scavone, Breton, Roffe-Vidal, & Beauregard, 2013).

The mechanism of mindfulness can be understood based on several different intervention-outcome aspects. In order to do this, the process of intervention is approached through its integral components, such as social support, elements of cognitive behaviour and relaxation, and separated from the central construct of mindfulness (Shapiro, Carlson, Astin, & Freedman, 2006).

Next, mindfulness is introspected on the basis of three axioms: intention, attitude, and attention. But one must be careful while referring this model because this is relatively less popular, which has gain very less empirical support. The axioms help develop the model of mindfulness that would in turn clarify the underlying mechanism of mindfulness.

Intention as an axiom is needed to provide the necessary focus for mindfulness (Bishop et al., 2004). However, the intention is never fixated but evolves itself to include a larger scope of operation, with the practice of mindfulness. Intention dynamically
progresses from regulation to exploration, and they finally lead to the liberation of the self (Shapiro & Schwartz, 2000).

Attention is the next axiom that implies a constant observation of experiences both internal and external. Attention necessarily involves a non-judgemental acceptance of the experience while paying heed. Cognitive psychology differentiates between different kinds of attention. Attention can occur in long lapses, short intervals with deliberate shifts from one object to another or the ability to control secondary sensations from arising (Parasuraman, 2000; Posner & Rothbart, 1992).

The third axiom is Attitude, which is the quality of awareness in mindfulness. It implies qualities of kindness, openness, curiosity, non-striving and acceptance with an exclusion of expectation and judgment (Kabat-Zinn, 2013; Shapiro & Schwartz, 2000).

The three fundamental axioms (IAA) help construct a model of mindfulness where non-judgmental attention backed by intention leads to a paradigm shift in mental processing. This shift is termed as reperceiving (Shapiro, Carlson, Astin, & Freedman, 2006). Accordingly, reperceiving is posited to be a meta-mechanism which is aided by supportive mechanisms such as: self-regulation, clarification of values, emotional, behavioral, and cognitive flexibility and exposure and leads to positive changes in the mental outlook. Shapiro et al. (2006) further maintain that the meta mechanism of reperceiving is comparable to the Western psychological concepts of deautomization (Deikman, 1983; Safran & Segal, 1996), decentralising (Safran & Segal, 1996) and detachment (Bohart, 1983).
Reperceiving is a natural developmental process that objectifies the subjective experience (Shapiro, Carlson, Astin, & Freedman, 2006). The distance that is established widens the limited perceptions and thus creates the context for empathy. The disidentification with an experience leads to a realization that the perceiver might be larger than the experience. It can be compared to the concept of cognitive diffusion in which one attempts to change the manner in which he engages with thought instead of changing the thought itself. The aggregate of the self is dismantled and found to be transient. However, reperceiving is not a disassociation from the self; rather it is an engagement with the self, without identifying with its experiences (Langer, 2014).

Self-regulation as a supporting mechanism to reperceiving is a process where the stability of the self becomes preserved. Attention backed by intention establishes a connection that is the pre-requisite for self-regulation. It in turn leads to better physiological and psychological health (Shapiro, Carlson, Astin, & Freedman, 2006). The next supportive mechanism, clarification of values, helps one to observe the values that he has adopted. It presents the perceiver with a choice to either imbibe or discard a reflexively adopted value. The third supportive mechanism, flexibility in emotion, cognition, and behavior, disengages oneself from experiences to embrace a more open approach. Flexible and freer responses replace the rigid patterns of habitual action. The fourth supportive mechanism, exposure, enables one to engage with even more intense emotional experiences. He or she becomes capable of managing his or her internal state as he or she no longer identifies with the arising physiological and psychological sensations.
Wells’ Self-Regulatory Executive Function (S-REF) is a model that highlights the psychological disorders arising out of intensified self-focus, rumination, and deliberate attention to negative beliefs which are quantified by the Metacognitions Questionnaire (Wells, 1990). The model suggests that external attention may be more beneficial for anxiety related disorders as opposed to internal attention that is favored by the mindfulness model. Teasdale’s differential activation hypothesis DAH theory is another model that outlines the possibility of a depressive relapse when the negative mental patterns activate (Teasdale et al., 2002). However, the IAA model that has been put forth still runs in accord with these models with a higher emphasis on the attitudinal concerns. It is an effort to further the process of structuring a theoretical framework and model of mindfulness. According to Shapiro et al. (2006), “intention, attention and attitude are not separate processes or stages—they are interwoven aspects of a single cyclic process and occur simultaneously. Mindfulness is this moment to moment process” (Shapiro et al., 2006, p. 375). However, mindfulness is a phenomenon still in its teething stage and yet to be explored with a good deal of sensitivity and theoretical frameworks. This preliminary model may pave the way for further development along those lines (Shapiro, Carlson, Astin, & Freedman, 2006).

Clinical application of mindfulness

The numerous benefits of mindfulness on affective and cognitive functions make it a reliable treatment for several clinical psychological disorders. Largely, mindfulness has been associated with the treatment of depression, anxiety, and stress. Mindfulness-
based interventions such as Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 2003), Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams & Teasdale, 2002), and variations of these interventions are supported and are found effective in clinical settings by a growing body of research.

Research has shown that certain facets and characteristics of mindfulness meditation correlated with the symptoms of mental disorders such as depression and anxiety. One such facet is non-reactivity, implying that the non-reactivity developed through mindfulness meditation can prevent an individual from emotionally and cognitively over-reacting to intrusive and repetitive thoughts (Desrosiers, Klemanski & Nolen-Hoeksema, 2013). It is in line with the belief that mindfulness targets the improvement of depression by alleviating emotion regulation processes in individuals (Jimenez, Niles & Park, 2010).

Since the facets of mindfulness can be linked to several mental health disorders, mindfulness-based treatments can be specifically designed to target particular symptoms in patients. For instance, patients with anxiety may have difficulty developing the attention dimension of mindfulness thereby making the process of treatment less effective. On the other hand, the ability to describe and label internal experiences developed through mindfulness helps patients achieve concreteness in their experiences. It reduces anxiety arousal symptoms, decreases worry, and reduces the repetition of thoughts, which would alleviate the condition of anxiety patients (Desrosiers, Klemanski, & Nolen-Hoeksema, 2013).
Another study was also conducted to evaluate the effectiveness of MBSR in depression, anxiety, and psychological distress (Bohlmeijer, Prenger, Taal & Cuijpers, 2010). The results of this meta-analysis demonstrated that MBSR has small but positive effects on depression, anxiety, and psychological distress. It implies that behavioral therapy incorporated with MBSR may have a more positive impact in improving anxiety, depression and distress symptoms. Thus, mindfulness-based interventions can be of great use when clubbed with existing behavioral and cognitive therapy modules (Bohlmeijer, Prenger, Taal, & Cuijpers, 2010).

Even group mindfulness meditation modules have shown a significant improvement of symptoms in patients with generalized anxiety disorder, panic disorder, and panic disorder with agoraphobia (Kabat-Zinn et al., 1992). In one study, a sample of 22 individuals were screened for generalized anxiety disorder or panic disorder with or without agoraphobia, and the participants were asked to undergo a meditation-based stress reduction and relaxation program. The group setting in which the relaxation and meditation took place was shown to effectively reduce the symptoms generated by anxiety disorders such as generalized anxiety disorders, panic disorders, and panic disorders with agoraphobia (Kabat-Zinn et al., 1992).

One popular clinical treatment module called Dialectical Behavioral Therapy (Linehan, 1993) is commonly used to treat borderline personality disorder and is also effective in reducing self-mutilating behavior and suicidal tendencies. An aspect of this therapy module is to offer mindfulness meditation training to improve the tolerance levels
of the patient. Therefore, mindfulness meditation can be significantly effective in reducing the symptoms of several mental health disorders, as well as, in reducing the relapse rate in disorders such as major depression (Teasdale et al., 2000).

**Effects of mindfulness**

The following studies demonstrate the effectiveness and impact of mindfulness on several affective and cognitive measures. Mindfulness has been known to positively impact psychomotor abilities, affect, emotional regulation, and cognitive functioning.

**Mindfulness and Psychomotor abilities.** One can also look into the effects of mindfulness on psychomotor abilities and other functions by analyzing the reaction time and error scores in experiments on measures such as attention, working memory, executive control and learning, where mindfulness has positively impacted the above. Based on more directed evidence, specifically at sensory motor performance and mindfulness, Naranjo and Schmidt (2012) explained that mindfulness allows for a more balanced perception of internal (interoceptive feedback) and external feedback (sensory feedback from movements). They explored the impact of mindfulness on perceptual motor awareness and motor accuracy during a visual-motor task with false feedback and found that for long term meditators’ performance accuracy improved with slower task execution.

**Mindfulness and mood states.** Several studies have attempted to examine the effect of mindfulness on affect. Mindfulness Based Stress Reduction (MBSR) programs are at the forefront of behavioral interventions aimed at relieving physical and
psychological symptoms. The typical MBSR program is an intensive eight-week retreat that encompasses a broad range of mindfulness techniques to increase mindfulness and cognitive awareness. By the early 1990s, MBSR interventions were popular in over 200 locations across the United States to aid individuals with chronic pain, anxiety, depression, stress, and other mental conditions.

A study by Schroevers and Brandsma (2010) concerning the effect of a standard eight-week mindfulness-based stress reduction (MBSR) program showed that it could significantly reduce the negative affect and increase the positive affect with moderate effect size. The study analyzed sixty-four individuals with mild to moderate psychological problems. The change in affect correlated with various measures of mindfulness.

A meta-analysis by Eberth and Sedlmeier (2012) provided a complete overview regarding how mindfulness meditation influences several psychological variables, exclusively for meditators practicing in non-clinical settings. The dependent variables studied were attention, intelligence, self-attributed mindfulness, positive and negative emotions, emotion regulation, personality traits, self-concept, self-realization, stress, and well-being. Results indicated that MBSR programs appeared to be more influential in achieving higher psychological well-being compared to studies with only mindfulness meditation as an intervention. While measuring the effects of mindfulness meditation on a number of psychological variables among a non-clinical population, it was found that
improvements in negative affect had the highest effect size (r=0.40) among other variables (Eberth & Sedlmeier, 2012).

In another experiment that applied quasi-experimental and longitudinal techniques, Orzech, Shapiro, Brown and McKay (2009) examined the function of rigorous mindfulness training on psychological symptoms, resilience and wellbeing within a group of sixty-nine adults. Orzech et al. (2009) found that a four-week intensive mindfulness training on mental health led to an increase in subjective well-being, as well as self-compassion, and a reduction in anxiety over time, amongst the participants. The mechanism underlining mindfulness that caused the positive impact was the development of trait mindfulness, decentering and increased acceptance.

A ten-day intensive *vipassana* training resulted in an improvement in depressive symptoms, rumination, and negative affect. However, no improvements in positive affect were seen (Chambers, Lo & Allen, 2008). It is important to note that the instrument used to measure affect was the Positive and Negative Affect Schedule (PANAS) which primarily assesses positive states of high arousal such as enjoyment rather than low arousal states such as contentment, which are more in line with the balanced positive feelings obtained through mindfulness. Short-term training has also been seen to improve positive mood, reduce negative mood, depression, fatigue, anxiety, and anger, as measured by the Profile of Mood States (POMS) when compared to a control group (Tang et al., 2007).
Mindfulness training has also been known to reduce negative moods and increase positive moods in individuals (Jain et al., 2007). Eighty-three students underwent a one-month mindfulness meditation along with somatic relaxation training in a study by Jain et al. (2007). They were then tested on variables such as psychological distress, positive state of mind, ruminative and distractive thoughts and behaviors, and spiritual experience. The results of this study demonstrated that brief mindfulness meditation training or somatic relaxation caused a reduction in distress and an improvement in positive mood state. This result may be because mindfulness has the ability to lower distractive and ruminative thoughts and behaviors, thereby providing a mechanism to increase positive mood and reduce distress (Jain et al., 2007).

Mindfulness and emotion regulation. Research also supports the common view that mindfulness reduces emotional reactivity. Emotion regulation refers to the capacity to regulate and control emotions and responses, and it is an important capacity for positive mental health and adaptive functioning (Gross, 1998). Mindful emotion regulation, according to Chambers, Gullone and Allen (2009), refers to an ability to remain aware of the present in a non-reactive manner, regardless of the emotional magnitude or valence of the experience, allowing the individual to consciously choose reactions rather than reacting automatically.

It has been demonstrated that mindfulness meditation groups recover faster from an induced sad mood as compared to a ruminating and distracted group (Broderick, 2005). This study was conducted on 139 female and 38 male participants who were
randomly assigned to a meditation, rumination or distraction condition. Ortner, Kilner and Zelazo (2007) conducted a study on individuals with mindfulness practice ranging from one month to twenty-nine years and found that mindfulness helped participants to disengage emotionally with emotionally upsetting pictures. These participants also performed better on cognitive tasks as opposed to individuals who saw those upsetting pictures but didn’t practice meditation.

The application of mindfulness to reduce stress is one very common area of study. Studies have shown that practice of mindfulness can reduce stress (Goyal, Singh, Sibinga, Gould, Rowland-Seymour, Sharma, & Haythornthwaite, 2014). A meta-analysis examining 30 studies applying MBSR and mindfulness-based cognitive therapy (MBCT) concluded that mindfulness can be of use in changing affectivity and cognitive functions (Hofmann, Sawyer, Witt, & Oh, 2010). It is consistent with the common understanding that mindfulness decreases negative affect and anxiety and increases positive affect. In one study, participants were randomly assigned to an eight-week MBSR group and the results were compared with participants in a control group on self-report measures of anxiety, depression, psychopathology, and functional magnetic resonance imaging (fMRI). Both groups watched sad movies as a part of the experiment (Farb, Anderson, Mayberg, Bean, McKeon & Segal, 2010). The results demonstrated reduced anxiety, depression and somatic distress in contrast to control group participants; fMRI data showed that participants in the MBSR group had less neural activity than control participants while being exposed to the sad movies. Moreover, the pattern of neural activity was distinct from their pattern before they were exposed to the MBSR.
Mindfulness and attention. Cognitive function is an important area of investigation in mindfulness studies. Chiesa, Calati and Serretti (2011) systematically reviewed evidence of mindfulness on measures of cognitive performance and found that mindfulness training enhances several domains of attention, working memory capacity and executive functioning. The positive effect of mindfulness meditation have been found on the cognitive skills of distinct populations, such as clinical populations (Baer, 2003; Grossman, Niemann, Schmidt & Walach, 2004) as well as non-clinical populations (Eberth & Sedlmeier, 2012). A meta-analysis focussing on non-clinical populations conducted by Eberth and Sedlmeier (2012) explored the impact of mindfulness meditation on psychological variables. There was an increase in cognitive skills such as attention ($r=0.30$) and intelligence ($r=0.32$) with medium effect size.

Mindfulness meditation has been found to improve attention, working memory, executive control, interoceptive awareness, independent self-regulation, and self-compassion (Brown & Ryan, 2003; Jha, Krompinger & Baime, 2007; Chambers, Lo & Allen, 2008; Orzech, Shapiro, Brown, & McKay, 2009; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010; MacLean et al., 2010; Holas & Jankowski, 2012). Jha, Krompinger and Baime (2007) found that participants who completed a mindfulness training program had enhanced orienting attention and alerting attention compared to a control group. This study compared a control group to novice participants who had no previous exposure to mindfulness meditation and were made to participate in an eight-week MBSR program, versus experienced practitioners were previously exposed to concentrative meditation and were sent for a one month intensive mindfulness retreat.
They demonstrated that during the initial stages of mindfulness training, concentrative attention or the dorsal attention system is improved as measured by the conflict monitoring and orienting attention subscale of the Attention Network Test (ANT), that divides attention into orienting, alerting and conflict monitoring. Experienced participants in retreat performed better on the conflict monitoring subscale of the ANT than novice MBSR practitioners. The attention-related behavioral responses were enhanced through an increase in the functioning of specific subcomponents of attention. Alerting attention is a component of attention that involves paying attention to one’s surroundings. Orienting attention, on the other hand, is directing one’s attention to a particular stimulus. Zeidan et al. (2010) studied the effects of a four-day brief meditation training on cognition and mood. Brief meditation was found to be successful in reducing fatigue, anxiety, and increasing mindfulness. It also improved visuospatial processing, working memory, and executive functioning.

In terms of types of mindfulness meditation training, long-term intensive mindfulness training has systematically demonstrated an improvement in regulating attention, awareness, and emotion (Bishop et al., 2004; Cahn & Polich, 2006; Chambers, Lo, & Allen, 2008; Jha, Krompinger & Baime, 2007; Lutz, Slagter, Rawlings, Francis, Greischer & Davidson, 2009; MacLean et al., 2010). Lutz et al. (2009) conducted a three-month-long intensive meditation training program. Participants were allocated to either a *vipassana* meditation group, which participants were required to attend for 10 to 12 hours per day or a novice group. This *vipassana* training showed a marked improvement in the participants’ ability to sustain attention during a dichotic listening task. A major
Conclusion of the study was that meditation training can considerably affect an individual’s attention levels and brain functioning. Further, the study revealed underlying neural mechanism that explains sustained attention such as increased phase consistency of the theta-band oscillatory neural responses due to reduced reaction time variability, reduced event-related desynchronization ERD to target tones in beta frequency resulting in reduced cortical engagement and increased stimulus-related neural processing. As intensive mindfulness meditation training involves relatively longer time and more effort. Researchers have also explored the impact of short-term mindfulness meditation on cognitive skills and found that it also corresponds to increased cognitive functioning (Tang et al., 2007; Zeidan et al., 2010).

Existing research shows that one of the most prominent cognitive functions enhanced through mindfulness meditation is attention. Bishop et al. (2004), envisioned mindfulness as a state of attention, where attention can be directed to and sustained by the present experience while advancing an open, aware orientation. Sustained attention is an important ability for task performance, adaptation, and goal-directed behaviour, and studies have demonstrated that mindfulness training improves sustained attention (Valentine & Sweet, 1999; Chambers, Lo, & Allen, 2008; MacLean et al., 2010).

Moore and Malinowski (2009) compared the ability to focus attention and suppress distracting stimuli among experienced mindfulness meditators versus participants in the control group without any mindfulness experience. The mindfulness group scored better on all measures of attention and also in the self-report mindfulness measures compared to participants in the control group. Through this study, Moore and
Malinowski (2009) established a correlation between cognitive flexibility and attention measures with mindfulness practice and the level of mindfulness.

Valentine and Sweet (1999) compared long term mindfulness meditators and long term concentrative meditators against controls on sustained attention. The two groups of meditators, along with a control group, took the Wilkins’ Counting Test. It is a test that measures sustained focused attention by asking participants to report the number of beeps they heard at the end of each series of beeps. The study found that both mindfulness and concentrative meditators has significantly better scores than the control group. Furthermore, no difference was observed amongst the two meditation groups when the stimulus was anticipated. But, when the stimulus was unforeseen, mindfulness meditators performed significantly better.

Looking at the longitudinal impact of intensive mindfulness training on sustained attention, MacLean et al. (2010) assessed their mindfulness participants during a three-month intensive retreat at three points in time – before training, mid-training and post training. The assessment was on a visual discrimination task and performance was compared to wait-list controls. A follow-up test was also conducted five months after the retreat. MacLean et al. (2010) found improvements in visual discrimination in the mindfulness group, along with improvements in vigilance, suggesting that reduced resource demands resulted in increased vigilance and sustained voluntary attention.

Mindfulness training has also found to reduce attentional-blink (Slagter, Lutz, Greischar, Francis, Nieuwenhuis, Davis, & Davidson, 2007), where when two targets are
produced in close succession (less than 500 ms) the second target is missed. The ability to detect the second target depends on the efficient allocation of resources to the first target. Through a three-month intensive vipassana retreat, participants showed a decrease in brain resource allocation to the first target which resulted in reduced attentional blink. Furthermore, participants who showed the highest decrease in resource allocation also showed the highest reduction in an attentional blink. That study demonstrates that mindfulness training helps in efficient allocation of brain resources (Slagter et al., 2007).

Chan and Woollacott (2007) examined the impact of meditation on executive processing as assessed by the Stroop task and orientation processing as evaluated by the Global-Local letters task. Participants included a group of 50 meditators and 20 controls. Amongst the meditators were 20 concentration meditators and 30 mindful meditators. Results demonstrated that experienced meditators showed reduced Stroop Test interference versus controls, which imply an improvement in executive processing and inhibition of automatic responses. Interference on the Stroop Task negatively correlated with the number of hours spent on meditation per day, rather than the total number of times meditated over one’s lifetime. However, no difference was found compared to controls in the Global-Local inference task that assessed orienting processing. Meditators performed faster in both the Stroop Test and the Global-Local letters task than controls, and no difference was found between the meditation style and the tasks. The lack of improvement in orienting processing is in contrast to the findings by Jha, Krompinger and Baime (2007). It can be explained by the different tasks used to assess orienting attention. Furthermore, one of the limitations of the Chan and Woollacott (2007) study is
that the Global-Local Letter task was performed by all subjects at near perfect levels. Therefore, a task of higher difficulty would be needed to assess better orienting processing. Also, the experienced meditator group varied in types of meditation and meditative experience from 82 to 19,200 hours overall that made the group very heterogeneous.

**Mindfulness and memory.** Memory is another function that can be improved by mindfulness practice as evidenced by an increase in performance in working memory of participants in a military study. In the study, working memory was improved among participants who practiced an eight-week long MBSR in comparison to a non-participating military control group and a general civilian control group (Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010).

Jha et al. (2010) examined how working memory capacity is influenced by mindfulness and predicted that mindfulness meditation increases cognitive control through improvements in working memory and assessed the protective effects of working memory on military as they were exposed to high stress and persistent demands. When a military mindfulness training group (an eight-week course) compared to a military control group during pre-deployment and a civilian control group on an operation span task, it was found that in the control groups the working memory capacity of the civilians remained stable, but the working memory capacity of the military control deceased. Among the mindfulness training groups, working memory capacity increased with increased mindfulness training practise time and decreased with low practice time.
Chambers, Lo, and Allen (2008) assessed participants on ten-day intensive *vipassana* training course compared to waitlist controls on working memory as tested by the Digit Span Backwards subscale of the Wechsler Intelligence Scale. Mindfulness meditation was found to correspond to a significant increase in score over time points. No change was observed in the control group, demonstrating that mindfulness meditation significantly increased working memory capacity (Chambers, Lo & Allen, 2008).

Additionally, Vugt and Jha (2011) investigated the improvement of attention control and working memory capacity in a delayed recognition working memory task with facial stimuli, as a result of intensive mindfulness training (One-month training). They found that intensive mindfulness meditation improved performance on a visual working memory task as assessed by reduced reaction time and lesser response variability with no change in accuracy of performance through increased distinguishability of information. They suggested that mindfulness improves working memory through improvement in information quality through attention (van Vugt & Jha, 2011).

Specifically looking at the improvement in working memory due to short-term mindfulness meditation, Zeidan et al. (2010) assessed working memory using the symbol digits modalities test and found improved performance compared to active controls. Teasdale et al. (2000) demonstrated that mindfulness impacts autobiographical memory since it allows for non-judgmental processing of the entire environment and richer encoding of details. In their study, a mindfulness-based cognitive therapy group for depressed patients improved their performance on a test of autobiographical memory.
Mindfulness has seen to impact memory positively, specifically working memory and executive processing (Chiesa, Calati & Serretti, 2011).

**Mindfulness and social cognition.** This area warrants more research since only a few studies have concentrated on the area of social cognition (Brown, Ryan & Creswell, 2007; Melloni et al., 2013). Many indirect lines of research in mindfulness build a solid base for a need to explore social cognition. These specifically concern empathy, compassion, altruism and prosocial behavior, and warrant the exploration of the impact of mindfulness on social cognition.

Mindfulness meditation supports closeness of relationship through increased receptive attention to a person's feelings, expression, body language and thoughts (Kabat-Zinn, 2003). Also, it has been demonstrated that increased understanding of the self is important for the understanding of others (Decety & Jackson, 2004). Dekeyser, Raes, Leijssen, Leysen and Dewulf (2008) demonstrated that increased mindfulness correlated with greater enhancement of empathic responses. Factors that improved as a result of mindfulness were body satisfaction, decrease in social anxiety and less distress contagion.

Melloni et al. (2013) discussed the effect of meditation on interoceptive sensitivity and social cognition. Interoception is the conscious perception and sensitivity to the stimuli we observe within our bodies. Meditation enhances this state in individuals. Melloni et al. (2013) selected three groups of the individual. A group of long term practitioners with an average of 4.35 years of practice, short-term practitioners who had
just completed an MBSR program and a control group of non-meditators were included. After conducting a battery of different tasks that included mood state, executive functioning and social cognition tests, it was found that meditation lowered anxiety and depression in both meditation groups compared to the control group. Social cognition was chosen as a variable since introspection has been proposed to modulate social cognitive processes through feedback. Introspection was assessed through a Heartbeat Detection Task, and social cognition through three tasks – emotional recognition, the theory of mind test and Index of Interpersonal Reactivity to measure empathy. Results found no difference in introspection perception on the Heartbeat Detection Task between the group, about social cognition. For the theory of mind, no difference was seen between groups. In empathy, differences were only observed in the personal distress scale, where lower scores were found in short-term meditators and long term meditators compared to the control group, which suggests increased emotion regulation. This preliminary study on the effects of mindfulness on social cognition needs to be interpreted with caution as the sample size included only nine short-term meditators and ten long term meditators. Also, empathy was assessed using a self-report form. Therefore, further research can be conducted on social cognition to obtain more conclusive results (Melloni et al., 2013).

Meditation of compassion is sometimes looked upon as a part of mindfulness meditation. Buddhist teachings imply that the primary result of meditation should be compassion (Davidson & Harrington, 2002). Meditation of compassion has been shown to impact prosocial behaviour in games of economic decision making (Leiberg, Klimecki & Singer, 2011), more altruistic behaviour in financial exchanges to benefit a victim
(Weng et al., 2013), and positive emotions towards those suffering (Klimecki, Leiberg, Lamm & Singer, 2012).

Condon, Desbordes, Miller and DeSteno (2013) conducted an experiment with high ecological validity to assess the prosocial behavior of compassion and mindfulness meditators, those with eight weeks of mindfulness training, and controls. The experiment involved observing the participant's interaction with a confederate who limped into the room where the participant was sitting and expressed pain. The participants were observed to see whether or not they offered their chair to the limping confederate even after another confederate in the room was apathetic towards the situation. Results showed that meditation did impact compassionate score, and no difference was found between compassionate and mindful meditators. It is one of the initial studies that display increased compassion as a result of meditation even in the face of social apathy (Condon et al., 2013). A follow-up study by Lim, Condon and DeSteno (2015) utilizing a similar experimental setup aimed to uncover if empathic accuracy boosted compassion in the mindful condition. However, no significant difference was found in empathic accuracy, as measured by the Emotion Recognition Test, between the mindful and active controls. While those participants in the mindfulness group offered their seats to the confederate in distress, there was no increase in empathic accuracy as a result of mindfulness practice. It implies that though mindfulness increases compassionate behavior, this relationship is not enhanced due to a rise in empathy.
Other studies also show that compassionate meditation training results in an increased activation of the neural network of empathy while listening to sounds of people suffering compared to controls (Lutz, Brefczynski-Lewis, Johnstone, & Davidson, 2008). Weng et al. (2013) also found that compassionate meditation was related to the activation of brain regions associated with social cognition and emotional regulation. Examples of these brain regions include the inferior parietal cortex and the dorsolateral prefrontal cortex.

**Mindfulness and learning.** Application of mindfulness as an instructional learning strategy was initiated by the work of Langer who looked at mindfulness as “a flexible state of mind in which we are actively engaged in the present, noticing new things and sensitive to context (Langer, 2000, p. 220).”

Mindful learning benefited students by allowing them to be more focused, more creativity, cognitively flexible, more open to new information and new categorizations, using multiple perspectives in problem solving, increased understanding of the environment and better able to deal with stressful situations (Langer, 2000). In order to increase mindfulness in learning, mindful manipulations such as drawing novel distinction in information, understanding information from multiple or new dimensions, providing information in conditional, for e.g., words like “could be”, rather than “absolute way”, and making information for students more memorable and meaningful rather than just memorising it, have shown to positively impact learning (Langer, 2000).
Moving to more specifically the effects of mindfulness on learning processes, Kirk and Montague (2015) examined mindfulness and reward prediction in a classical conditioning task, comparing long-term Buddhist meditators to controls. Among Buddhist long-term meditators, the impact of rewards had diminished, with reduced prediction error signal in the ventral striatum, along with an increased activation of the posterior insula. As the posterior insula is related to interoceptive processing, this provided evidence that mindfulness meditation weakens reward prediction signals through increased interoceptive awareness.

The focus of mindfulness has also been on implicit learning, and mindfulness studies have shown that mindfulness reduces implicit learning (Whitmarsh, Udden, Barendregt & Petersson, 2013). Reber (1967) referred to implicit learning as a type of learning that occurs without conscious intent or awareness to learn. Whitmarsh et al. (2013) utilized an artificial grammar paradigm to assess implicit learning and dispositional mindfulness as evaluated by the Five Facet Mindfulness Questionnaire (FFMQ), and found that mindfulness reduced the automatic and habitual urge to attain preferences unconsciously. Post-hoc analysis indicated a negative correlation between non-judging of inner experiences subscale of the FFMQ with endorsement rates. It suggested that impaired implicit learning was due to the non-reactivity and judgemental nature of the mindfulness disposition (Whitmarsh et al., 2013).

Stillman, Feldman, Wambach, Howard, and Howard (2014) assessed implicit sequence learning, which refers to the automatic ability to learn complex regularities in
sequences without conscious awareness. Two tasks assessed it, the Triplets Learning task and the Alternating Serial Response Time task, among a group of students and a group of general adults. Stillman et al. (2014) found a negative relationship between the Mindful Attention Awareness Scale (MAAS) score and implicit sequence learning on both tasks. The inference was that the mechanism of mindfulness leading to decreased implicit learning was the effortful engagement of control processes.

**Hypotheses**

As evidenced by the above presented review of literature, one can conclude that mindfulness training has often been a significant precursor of improvement in areas such as psychomotor functioning, improvement of positive mood, emotional regulation, attention, memory, social cognition, and learning. It forms the basis of hypotheses formulated in the current study. This study proposed the following hypotheses for testing:

1. Short format body-scan meditation practice increases the state mindfulness level

2. Short format body-scan meditation practice reduces negative affect and increases positive affect

3. Short format body-scan meditation practice increases performance in cognitive tasks related to psychomotor function (reaction time), attention, learning, simple memory and social cognition.