

**Mindfulness: Relations to attention regulation, decentering, and psychological well-being**

**Torbjörn Josefsson**

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## Abstract

The current research project consists of three separate studies. The general aim of this project was to contribute to previous mindfulness research by exploring fundamental aspects of mindfulness in an effort to increase the understanding of mindfulness as a construct as well as its mechanisms. The purpose of the study I was to investigate the relation between mindfulness and sustained and executive attention by comparing Buddhist and Western mindfulness meditators ( $n = 47$ ) and non-meditators ( $n = 45$ ) in performance on computerized attention. The main purpose of study II was to compare these meditators and non-meditators on self-reported mindfulness, and also to investigate whether facets of mindfulness mediate the relation between meditation experience and psychological well-being. Study III aimed at investigating the unique effects of mindfulness practice as well as the proposed mindfulness mechanism; decentering. A short-term mindfulness-based intervention (MBI) ( $n = 46$ ) was compared with relaxation training ( $n = 40$ ) and a waiting-list group ( $n = 40$ ) on a battery of tests - executive attention, self-reported mindfulness, decentering, psychological well-being, anxiety, depression, and coping styles – in 126 employees with no prior meditation experience.

The results showed no significant differences between meditators and non-meditators either in sustained or executive attention. Meditators rated themselves higher than non-meditators on four of the five facets of mindfulness. The multiple mediation analysis showed that the five mindfulness facets mediated the relationship between meditation experience and psychological well-being but no single facet contributed significantly. Simple mediation analyses indicated, however, that Non-Reactive was the primary mediator. No unique mindfulness effects were found since there were no differences between mindfulness and relaxation in any of the variables. However, the mindfulness group scored higher than the

waiting-list group on the Five Facet Mindfulness Questionnaire total scale and psychological well-being.

Meditators may have an increased awareness of internal processes and the ability to quickly attend to them, but this type of refined attentional ability does not seem to be related to performance on attention tests requiring quick responses to external targets. It may be concluded that effects on attention regulation are of less importance compared to other beneficial psychological and physiological health outcomes due to mindfulness meditation. Mediation analyses supported (i) the notion that meditation experience is related to increased mindfulness, which in turn is associated with improved psychological well-being, and (ii) the idea that increases in mindfulness lead to increased decentering abilities which in turn leads to improved psychological well-being. Possible explanations for the absence of unique group differences between mindfulness and relaxation are that the length of the intervention was too short and the sessions too few, similarities between body exercises in MBI and relaxation, and the lack of group differences on decentering.

Investigating unique mindfulness effects to distinguish mindfulness effects from relaxation should be prioritized in future studies. The promising theory of mechanisms proposed in the Buddhist Psychological Model (BPM) needs to be empirically evaluated. MBI-related changes in self-perceptions, value systems, and ethical aspects may play a more important role for improved psychological health than what has previously been recognized. Other Buddhist practices such as loving-kindness meditation and compassion meditation also need to be examined. Finally, an in-depth dialogue between Western researchers, expert meditators, and Buddhist theoreticians may be increasingly important for mindfulness research to advance.

*Key words:* attention, Buddhism, decentering, mediation analysis, meditation, mindfulness, psychological well-being.

## Svensk sammanfattning

Föreliggande forskningsprojekt består av tre separata studier. Det övergripande målet med projektet var att bidra till mindfulness forskning genom att undersöka fundamentala aspekter av mindfulness med ambitionen att öka förståelsen av mindfulness som begrepp samt dess mekanismer. Syftet med studie I var att undersöka relationen mellan mindfulness och uppmärksamhetsförmåga (bibehållande och exekutiv uppmärksamhet) genom att undersöka Buddhistiska och Västerländska meditatörers (n = 47) och icke-meditatörer (n = 45) prestation på datoriserade uppmärksamhetstester. Syftet med studie II var att jämföra ovan meditatörer och icke-meditatörer på självskattad mindfulness, och även att undersöka om mindfulness facetter medierar relationen mellan meditationserfarenhet och psykologiskt välbefinnande. Studie III avsåg att studera unika effekter av mindfulness träning samt den föreslagna mindfulness mekanismen; decentrering. En kort-tids mindfulness baserad intervention (MBI) (n = 46) jämfördes med avslappningsträning (n = 40) samt med en väntelista grupp (n = 40) på flera tester – exekutiv uppmärksamhet, självskattad mindfulness, decentrering, psykologiskt välbefinnande, ångest, depression, och coping stil – hos 126 yrkesverksamma individer utan tidigare meditationserfarenhet.

Resultaten visade inga signifikanta skillnader mellan meditatörer och icke-meditatörer i bibehållande eller exekutiv uppmärksamhet. Meditatörer skattade sig själva högre än icke-meditatörer på fyra av de fem mindfulness facetterna. Multipel medieringsanalys visade att de fem mindfulness facetterna tillsammans medierade relationen mellan meditationserfarenhet och psykologiskt välbefinnande men ingen enskild facett bidrog signifikant. Enkel medieringsanalys indikerade emellertid att Inte-Reagera var den primära mediators. Inga unika mindfulness effekter hittades eftersom det inte fanns några signifikanta skillnader mellan mindfulness gruppen och avslappningsgruppen i någon av de undersökta variablerna.

Mindfulness gruppen skattade sig dock signifikant högre än väntelista gruppen på den totala FFMQ-skalan samt i psykologiskt välbefinnande.

Meditatörer kan besitta en ökad medvetenhet om interna processer, liksom en förmåga att snabbt uppmärksamma dessa men den här typen av förfinad uppmärksamhetsförmåga verkar inte vara relaterad till prestation på uppmärksamhetstester där det krävs snabba responser på externa stimuli. Slutsatsen kan dras att effekter av mindfulness meditation på uppmärksamhetsförmåga verkar vara av mindre vikt jämfört med andra psykologiska hälsovinster. Resultaten av medieringsanalyserna gav stöd åt (i) föreställningen att meditationserfarenhet är relaterat till ökad självskattad mindfulness, vilket i sin tur är associerat med ökat psykologiskt välbefinnande, samt att (ii) ökad mindfulness leder till ökad decentring, vilket sedermera är relaterat till ökat psykologiskt välbefinnande. Möjliga förklaringar till varför inga unika gruppskillnader mellan mindfulness och avslappning kan vara att interventionslängden var för kort och antalet sessioner för få, likheter mellan kroppsövningar i mindfulness interventionen och avslappning, och avsaknaden av gruppskillnader i decentering.

Undersökningar med avseende på unika mindfulness effekter i syfte att särskilja distinkta mindfulness effekter ifrån avslappningseffekter bör prioriteras i framtida forskning. Den lovande BPM teorin angående mindfulness mekanismer behöver värderas empiriskt. MBI relaterade förändringar i själv-uppfattningar, värdesystem och etiska aspekter kan inneha viktigare roller för ökat psykologiskt välbefinnande än vad som tidigare har antagits. Andra Buddhistiska övningar såsom kärleks-vänlighetsmeditation och meditation för medkänsla behöver också studeras i större utsträckning. Slutligen, ett ökat samarbete och en djupare dialog mellan Västerländska forskare, expert meditatörer och Buddhistiska teoretiker kan bli en allt viktigare förutsättning för mindfulnessforskningens fortsatta utveckling.



*Key words:* Buddhism, decentrering, mediering, meditation, mindfulness, psykologiskt  
välbefinnande, uppmärksamhet.

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This thesis is based on the following papers, which will be referred to in the text by their roman numerals:

Study I. Josefsson, T., & Broberg, A. G. (2011). Meditators and non-meditators on sustained and executive attentional performance. *Mental Health, Religion & Culture, 14*, 291-309.

Study II. Josefsson, T., Larsman, P., Broberg, A. G., & Lundh, L-G. (2011). Self-reported mindfulness mediates the relation between meditation experience and psychological well-being. *Mindfulness, 2*, 49-58.

Study III. Josefsson, T., Lindwall, M., & Broberg, A. G. (2012). The effects of a short-term mindfulness based intervention on self-reported mindfulness, decentering, executive attention, psychological health, and coping style: examining unique effects and mediators. *Mindfulness*, DOI 10.1007/s12671-012-0142-1.

## **Introduction**

Mindfulness is a complex concept and it can mean different things in different contexts. Several aspects of mindfulness will be presented in the current introduction. After a brief introduction of the integration of mindfulness into Western scholarship, the origins of mindfulness is described, followed by definitions of the term. Thereafter, the assessment of mindfulness and psychometric difficulties will be introduced. Next, Western theoretical models of mindfulness will be presented. After that, a short section will introduce the reader to the techniques and methods used in mindfulness meditation. The following part will treat the relationship between mindfulness and psychological well-being, and the effects of mindfulness-based interventions (MBIs) on psychological health. Thereinafter, two separate parts describing relations between mindfulness and attention, and mindfulness and coping are presented. Finally, the general aim of the current thesis as well as the specific aims of the three empirical studies on which this thesis is based, along with the hypotheses, closes the introduction.

Mindfulness is a 2500-year-old Buddhist term and the concept of mindfulness can be found in Buddhist literature in many different contexts. For instance, (right) mindfulness is the seventh factor of the Noble eightfold path leading to the extinction of suffering (Thera, 1996). During the last two decades, “mindfulness”, its philosophy, and various methods have been integrated into and established in Western clinical interventions as well as in different health care settings (e.g. Hayes, Strosahl, & Wilson, 1999; Kabat-Zinn, 2004; Linehan, 1993; Segal, Williams & Teasdale, 2002), and there is a growing body of evidence showing improved psychological health due to mindfulness-based programmes (e.g. Grossman, Niemann, Schmidt, & Walach, 2004; Reibel, Greeson, Brainard, & Rosenzweig, 2001; Segal et al., 2002; Tang et al., 2007). Psychological research on mindfulness has mainly focused on its effects on mental and physical health. Evaluation of the effects of mindfulness-based

interventions on health is an important first step in the scientific analysis of the mindfulness concept (Hayes & Wilson, 2003). However, further research on the subject remains a problem because the term mindfulness is often used to denote several different things: (i) a method or a collective term for different techniques, (ii) a psychological process or (iii) the outcomes of mindfulness methods (Hayes & Wilson, 2003). Thus, “mindfulness” can be referred to as the practice of mindfulness meditation as well as the effects of this practice. Brown and Cordon (2009) stressed that a necessary scientific principle for a phenomenon to be studied is that the concept is “properly defined and measured” (p. 59), and further, that “mindfulness is not well understood within contemporary behavioural science” (p. 60). Since the concept of mindfulness is not clear - how it works and why it has these documented beneficial psychological health effects -several researchers have emphasized the importance of thoroughly studying the construct of mindfulness itself to develop an operational definition of mindfulness to be used in future studies (Baer, 2003; Bishop et al., 2004; Brown & Ryan, 2004; Dorjee, 2010; Hayes & Wilson, 2003; Shapiro, Carlson, Astin, & Freedman, 2006).

### **The roots of mindfulness**

The original Buddhist term for mindfulness is the Pali word *sati* - *smṛti* in Sanskrit, and *dranpa* in Tibetan (Kang & Whittingham, 2010) - meaning “remembrance” or “memory” (Analayo, 2006), but according to Thera (1996), it is more frequently used as a description of a certain quality of attention or awareness that is skilful and right from a Buddhist perspective. Concerning the memory aspect of mindfulness, Analayo (2006) further clarified that mindfulness is necessary to understand and process information, and only information that has been mindfully processed and comprehended can be remembered. A different view of the original meaning of memory and remembrance in the mindfulness concept is provided by Siegel, Germer and Olendzki (2009), who pointed out that this aspect is not referred to as the

ability to remember past events, but to keep “remembering to be aware and pay attention” (p. 18). Gethin (2011) also interpreted the purport of remembrance/memory to be less a matter of being good at remembering certain facts and more about being alert and not absent-minded. Sati functions as a constant reminder “of who we are and what our values are” (p. 270), and is said to include two specific characteristics, related to both memory and ethics. First, sati has the function of “calling to mind wholesome and unwholesome qualities such that the meditator is in a position to know which qualities are the ones he should pursue and which are the ones he should not” (Gethin, 2011, p. 269). Second, “sati is said to follow the outcome of qualities and so to know which qualities are beneficial and which are not with the result that the meditator can remove those which are not helpful and take possession of those which are helpful” (Gethin, 2011, p. 270). Sati is frequently combined with another term, *patthana*, translated as “placing near ‘(one’s mind)’, meaning keeping present, remaining aware, establishing” (Thera, 1996; p.10). This dual term, *satipatthana*, is usually referred to as “right mindfulness” in Buddhist scriptures and can be translated as “presence of mindfulness or as attending with mindfulness” (Analayo, 2006, p.36). Satipatthana is seen as an essential part of the path leading to liberation from all suffering (Kang & Whittingham, 2010; Thera, 1996). To reach a state of mindfulness, one needs to employ the method of “bare attention”, defined as “the clear and single-minded awareness of what actually happens to us, and in us, at the successive moments of perception” (Thera, 1996, p.30). It should be noted though that different Buddhist schools do not share a consensus definition of mindfulness; rather, they tend to emphasize different aspects of mindfulness, in theory as well as in practice (Gethin, 2011; Kang & Whittingham, 2010). For instance, the aforementioned term bare attention has its roots in Theravada Buddhism, but “is virtually absent” (Dorjee, 2010; p. 154) in two other major Buddhist traditions, Mahayana and Vajrayana. Nonetheless, arguably the most influential Buddhist source in Western understanding and conceptualizations of mindfulness

is Nyanaponika Thera's book, *The Heart of Buddhist Meditation*, first published in 1954. Western mindfulness researchers frequently refer to Thera when describing and defining the "true" nature of mindfulness. Consequently, Western conceptualizations and practice of mindfulness, for instance, as it is taught in Mindfulness Based Stress Reduction (MBSR; Kabat-Zinn, 2004) have mostly been adopted from traditions in Theravada Buddhism, particularly Nyanaponika Thera's view of mindfulness (Dorjee, 2010; Gethin, 2011), that in turn stems from the Burmese School of Mahasi Sayadaw (Kang & Whittingham, 2010).

### **Descriptions of mindfulness**

Despite the fact that mindfulness has received quite a lot of empirical attention, not the least from the clinical psychological research area, it is far from clear what mindfulness is and what it is not, and in general how it should be best understood. Brown and Ryan (2003), two of the few early Western psychologically oriented mindfulness researchers that paid more interest in the theoretical concept of mindfulness than mindfulness-related treatment effects argued that mindfulness is "inherently a state of consciousness" (p. 824). In Buddhist literature, "consciousness is not a subject, but an activity, a process, an event recurring moment after moment" (Olendzki, 2011, p. 67). The particular mindful state is available to everyone but the capacity to more frequently reach this particular state can be enhanced and cultivated by mindfulness meditation techniques. Mindfulness is related to two major functions of consciousness: *awareness*, defined as "the background radar of consciousness, continually monitoring the inner and outer environment" (Brown et al., 2007, p. 822), and *attention* defined as "a process of focusing conscious awareness, providing heightened sensitivity to a limited range of experience" (Brown et al., 2007, p. 822). Awareness covers a broad spectrum of registering stimuli in the entire field of consciousness, while attention is more of a controlled process of narrowing the focus on a specific stimulus. Awareness and attention are



closely related but one can be aware of inner and outer objects such as sounds, physical sensations, actions, and emotions, without attending to them (Brown & Ryan, 2003; Brown & Ryan, 2004; Brown et al., 2007).

Sensory objects are almost always immediately followed by mental and emotional reactions. These reactions usually start with a primary appraisal of what this specific object represents to the self, that is, to “me and my goals”. Will the appearance of this specific object affect “me and my life” in a positive, neutral, or negative way? The reactions are often deeply influenced by previous experiences of the particular object or similar objects and these experiences are then assimilated into existing schemas (Brown et al., 2007; Brown & Cordon, 2009). The consequence of these conditioned mental and emotional reactions is that “sensory objects and events are rarely seen impartially, as they truly are, but rather through the filters of self-centred thought and prior conditioning, thereby running the risk of furnishing superficial, incomplete, or distorted pictures of reality” (Brown et al., 2007, p. 212). In the state of mindfulness, it is possible to simply observe every present stimulus that arises in the inner and outer world without self-oriented reflections, evaluations, judgements, analyses, or elaborations. Internal objects such as thoughts and emotions can be the focus of mindful observation, in a manner similar to the way external objects (e.g. sound, smell, taste, and sight) can be observed. Mindful processing could make it possible to process information, without passing through the cognitive schemas of the self, containing values, opinions, expectations, identifications, and so on (Brown et al., 2007).

### **Characteristics of mindfulness**

Mindfulness is often described as something that takes place exclusively in the “here and now” (e.g. Kabat-Zinn, 1994) but the human mind has a strong tendency to engage in time travelling. People may spend a great deal of time thinking about past events, for example

daydreaming about glory days associated with happiness and good times, or the opposite, dwelling on and trying to solve distressing experiences or traumas. Likewise, there is also a tendency to fantasize about big dreams coming true in the future (“when I get the perfect job”, “when I meet the right partner”, “when my vacation starts”, and so on), or worry and fear of what the future might bring. Therefore, we tend to make plans and work hard to put in place the best possible strategies to pursue our goals and avoid potential dangers and problems. One consequence of this time travelling is that the present moment is not fully experienced (Brown et al., 2007). Thus, the information existing in the present inner and outer environment is only partly acknowledged, and as Borkovec (2002) puts it; “The only real information that is available is that which exists in the present moment” (p. 78). By attending solely to the present moment, not only does more information become available for processing, but the information at hand is more likely to be accurately processed without the regular interruptions of mental and emotional reactions craving attention, and thereby improve the capability of adequately and adaptively responding. Hence, a present-centred attention could make it possible for the information processing system to work optimally, which basically, as Borkovec (2002) hypothesized, will maximize adaptability and survival.

Another core characteristic of mindfulness is its non- or pre-conceptual awareness. As previously mentioned, mindfulness may principally be seen as a state of consciousness. The Buddhist meditation teacher Rosenberg (1998) described the function of mindfulness as of a mirror, simply reflecting everything that arises in the field of consciousness without cognitive elaboration. Habitually, awareness, attention, and cognition are often closely linked to one another and, as previously mentioned, when attending to some kind of sensory object, cognitive operations are usually automatically and immediately triggered. In a mindful state, on the other hand, mental and emotional activities are reduced and may even be completely absent; a certain type of altered state of “pure” and “silent” consciousness emerges (Brown et

al., 2007). Brown, Ryan and Creswell (2007), in their comprehensive overview of theoretical aspects of mindfulness, pointed out that Western clinicians have traditionally shown an enormous interest in the content of consciousness (thoughts, emotions, memories, images, and so forth) rather than consciousness as a phenomenon in itself. The free association technique used in Freud's psychoanalysis is only one example of the great attention and importance paid to the content of consciousness (Gay, 1990). Consciousness in Eastern meditative traditions can be classified in different levels, from shallow to deep awareness: "(i) the externally oriented senses, (ii) the discursive thinking mind, (iii) the intellect capable of discriminating between the mind's diverse contents, (iv) the ego that experiences these contents and takes them to be its own, (v) pure positive affect (happiness, bliss, etc.), the desire for which underlies the ego's responses to different experiences, and finally (vi) pure consciousness itself, without which experience could not exist in the first place" (Shear, 2010, p. 699). The first four levels have been acknowledged and extensively studied in Western psychological research. The two deepest levels on the other hand, have not gained much empirical attention. Pure consciousness can be defined as the "complete absence of all sounds, tastes, thoughts, feelings, images, and anything else that one can ever imagine" (Shear, 2010; p. 700). In meditative traditions, pure consciousness, as the deepest level of awareness, is seen as crucial for the development of all other levels. For many Western scientists, it is probably rather odd and difficult, if not impossible, to even grasp the idea of a consciousness that is completely empty and silent, and this so-called "non-cognitive approach" to consciousness has consequently been widely debated (see Overgaard & Grünbaum, 2011, for an overview). For instance, it has been questioned whether it is possible to be consciously aware of content without any cognitive activity. The non-cognitive approach regards consciousness as a state whereas the cognitive-approach sees consciousness as a controlled cognitive process related to functions such as attention and working memory (Overgaard & Grünbaum, 2011).

However, preliminary research on pure consciousness in expert meditators (e.g. Travis & Wallace, 1997) does appear to support the existence of a “contentless” consciousness (see Shear, 2010, for an overview). Nonetheless, it remains for future research to further establish whether it is possible to develop such a state of pure consciousness by meditation.

### **Definitions of mindfulness**

There have been many ambitious attempts by Western researchers in psychology to define and operationalize mindfulness in a way that is true to its original Buddhist meaning. The majority of these definitions include attention and awareness to present experiences.

However, the definitions differ greatly, depending on what mindfulness related aspects (i.e. qualities and attitudes) have been included and emphasized as integral parts of the mindfulness construct (Grossman & Van Dam, 2011). Brown et al. (2007) defined mindfulness simply as a “receptive attention to and awareness of present events and experience” (p. 212). Similarly, Marlatt and Kristeller (1999) regarded mindfulness as a process of “bringing one’s complete attention to the present experience on a moment-to-moment basis” (p. 68). Martin (1997), on the other hand emphasized the psychological freedom “that occurs when attention remains quiet and limber, without attachment to any particular point of view” (pp.291-292). Thus, Martin’s (1997) definition seems to highlight the outcomes of mindfulness rather than the contents. The most frequently used definition in the area of mindfulness is Kabat-Zinn’s (1994) “paying attention in a particular way: on purpose, in the present moment and non-judgementally” (p. 4). Kabat-Zinn (1994) has included three aspects in his definition that are absent in the previously mentioned definitions: first, that attention is paid in a “particular way”; second, that there is an act of will (“on purpose”); and finally, that the quality of attention is of a non-judging character (“non-judgementally”). However, Brown et al. (2007) pointed out that Kabat-Zinn’s (1994)

definition is more a description of the training in the MBSR-programme than a definition of the mindfulness construct per se. Partly similarly to Kabat-Zinn (1994), though, Buddhist meditation teachers Goldstein and Kornfield (2001) also included a non-judging aspect of mindfulness: "mindfulness means awareness, openness, and acceptance of whatever arises, without attachment to the pleasant, aversion to the unpleasant, or forgetfulness of neutral feelings" (p. 154). In line with Martin (1997), Goldstein and Kornfield (2001) also include a "non-holding on to" aspect of the present stimuli. Thus, Goldstein and Kornfield (2001) did not specifically include the act of attention in their definition. Still, the majority of definitions consider attention and awareness in the present moment as key features of mindfulness. The differences between the definitions above seem to be the emphasis some definitions place on the quality of attention (Kabat-Zinn, 1994), the attitude towards the present inner and outer experiences (Goldstein & Kornfield, 2001; Kabat-Zinn, 1994; Martin, 1997), and finally, a lack of attachment to any of the stimuli exists (Goldstein & Kornfield, 2001; Martin, 1997).

All of the above-mentioned definitions are examples of what now may be called early attempts to capture the complexity of mindfulness in parsimonious scientific definitions. Nevertheless, the variations in how to interpret, define, and operationalize the mindfulness construct have caused a significant lack of clarity as to exactly what mindfulness is and what it is not. As previously mentioned, sometimes mindfulness is understood more as a practice and defined as such (e.g. Kabat-Zinn, 1994). In other cases mindfulness is seen and defined as a state (Brown et al., 2007). Thus, a consensus definition of mindfulness is highly warranted (e.g. Chiesa, 2012; Dorjee, 2010; Mikulas, 2010). Recently, several researchers have challenged the prevailing definitions by studying the Buddhist literature more closely in an effort to better understand the nature of mindfulness. First, Gethin (2011) noted that ethical aspects, inherently integrated with mindfulness in Buddhist practices, are completely absent in Western definitions of mindfulness. Furthermore, it has been highlighted that mindfulness,

according to the Buddhist view, is not easily separated from its cultural and ethical contexts. In fact, extracting and separating mindfulness from ethically skilful behaviours and virtues such as compassion, loving kindness, sympathetic joy, equanimity, and insight may diminish and simplify the rich complexity of mindfulness. Thus, cultivating mindfulness in Buddhist practice automatically means that one also cultivates ethical and wholesome behaviours and virtues (Chiesa, 2012; Grossman & Van Dam, 2011; Mikulas, 2010; Olendzki, 2011). From a Buddhist perspective, it may even be a mistake to cultivate mindfulness without integrating ethical aspects (Mikulas, 2010).

Second, a mindfully, present-centred attention also has certain qualities; it is not merely paying attention: “mindfulness is not just heightened attention, but is attention that has become confident, benevolent, balanced, and fundamentally wholesome” (Olendzki, 2011, p. 64).

So, how then should mindfulness be defined without losing essential Buddhist features and still be conceivable in a Western context? Kang and Whittingham (2010) proposed a Buddhist-influenced definition whereby mindfulness is defined as “nonreactive, nonelaborative, nonreified awareness that has meta-cognitive functions, monitoring ongoing awareness and discriminating wisely between aspects of awareness content so that awareness and behaviour can be directed according to the goals of genuine happiness, virtue, and truth. Thus, mindfulness can be focused on present moment experience, sustaining attention on a familiar object or on systematic recollection of constructive ideas, in a way that is volitionally generated or spontaneously emergent” (p. 170). This definition is to some extent similar to Mikulas’s (2010) more economical definition of mindfulness as “awareness behavior of the the mind” (p. 2), in which mindfulness acts as “the active maximizing of the breadth and clarity of awareness” (p. 5). However, in Kang and Whittingham’s (2010) definition, the awareness is discriminative and directed towards ethical and wholesome aspects, whilst

Mikulas (2010) has chosen not to specify to what extent mindful awareness is "ethical" or not. One should also note that neither Kang and Whittingham (2010) nor Mikulas (2010), as opposed to earlier writers (e.g. Kabat-Zinn, 1994), included any non-judging or accepting attitudes in their definitions. Thus, current working definitions of mindfulness carefully try to incorporate more Buddhist elements, while at the same time excluding attitudinal aspects in an effort to stay true to the original Buddhist roots of mindfulness. However, Mikulas' (2010) definition does not seem to differ that much from the straightforward definition that Brown et al. (2007) offered. Perhaps it is possible to interpret that Mikulas's (2010) definition, in a subtle way, implies a heightened and refined awareness, perhaps even an ethically wholesome awareness, instead of "plain" and "ordinary" awareness.

Based on recently introduced Buddhist-influenced definitions and theories of mindfulness (e.g. Kang & Whittingham, 2010; Mikulas, 2010), it appears that the core feature in contemporary Western mindfulness definitions is a certain kind of "high-qualitative" meta-awareness that possibly not only discriminates between unwholesome/unhealthy and wholesome/healthy contents of the mind but also guides the focus of awareness as well as behaviours in accordance with these ethical values.

### **Assessing mindfulness**

Recently, as briefly mentioned earlier, several authors have argued for the importance of an operational definition of mindfulness, and valid instruments for its measurement, as essential for further research on mindfulness (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Baer et al., 2008; Bishop et al., 2004; Shapiro, Carlson, Astin, & Freedman, 2006). For this purpose, a number of research groups have developed self-assessment questionnaires for measuring mindfulness (see Bergomi, Tsacher & Kupper, 2012, for an overview of mindfulness questionnaires). On the basis of factor analyses of the combined pool of items

from five such questionnaires, Baer et al. (2006) identified five factors that led to the construction of the Five Facet Mindfulness Questionnaire (FFMQ): *Nonreactivity to inner experiences*; referring to a certain ability to “step back” from feelings and distressing thoughts and not getting lost in them; *Observing*, which is described as a tendency to notice and attend to sensations, thoughts, feelings and perceptions; *Acting with awareness*; a concentrative and nondistractive attentiveness on present behaviour and activities which further could be described as the opposite of doing things on “automatic pilot”; *Describing*, the capacity to verbalize and express thoughts, opinions and feelings; and *Nonjudging of experience*, a general view of self-acceptance and a tolerance of one’s thoughts and feelings without judgments and condemnations. (Further information on the FFMQ can be found later on in this thesis).

One central hypothesis, using Baer et al.’s (2008) and Bishop et al.’s (2004) formulation, is that mindfulness meditation improves self-reported mindfulness, or “mindfulness skills”. There is some support for this hypothesis; significant increases in post- compared to pre-test scores, with effect sizes ranging from moderate to large, were found on all subscales of the FFMQ in participants taking part in a Mindfulness Based Stress Reduction programme (MBSR; Kabat-Zinn, 2004) (Carmody & Baer, 2007). Further, Baer et al. (2008) found that meditation experience was positively correlated to four of the five mindfulness facets (all except Acting with awareness), while controlling for age and education. Moreover, the result also showed that meditators scored higher than non-meditators on all facets of mindfulness. Similarly, Lilja et al. (2011) found that meditation experience was positively correlated with the FFMQ scales, and that meditators scored significantly higher than non-meditators on the total FFMQ scale as well as on Non-Reactive, Describing and Observing (although not on Act-Aware or Non-Judging). Several other studies have also shown higher scores for meditators on self-report measures of mindfulness, as well as positive relations between



meditation experience and self-reported mindfulness in Buddhist populations (Brown & Ryan, 2003; Chambers, Loo & Allen, 2008; Lau, Walach, Buchheld, Buttenmuller, Kleinknecht & Schmidt, 2006).

Even if the majority of these mindfulness instruments have been successfully validated (e.g. Brown & Ryan, 2003; Baer et al., 2006; Baer et al., 2008), serious criticism of the psychometric assessment of these self-report measures has been presented (Grossman, 2008; Grossman & Van Dam, 2011).

First, because of the confusion regarding what mindfulness is (a state, a trait, a process, or a method?) researchers have emphasized several different characteristics associated with mindfulness in their operationalizations, which have resulted in self-report scales containing prominent differences. For instance, there is a large variety in the number of subscales, ranging from one scale only (the MAAS; Brown & Ryan, 2003) to five subscales (the FFMQ). The self-report scales also show several differences concerning content. The FFMQ (Baer et al., 2006) includes a dimension concerning the ability to verbalize experiences, the Toronto Mindfulness Scale (Lau et al., 2006) emphasizes an attitude of curiosity, the MAAS focuses primarily on attention to and awareness of experiences (i.e. inattentiveness to daily activities), and the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004), the FFMQ (Baer et al., 2006) and the FMI (Buchheld et al., 2001) seem to highlight a general tendency to notice physical sensations and perceptions (Grossman, 2008). Thus, these are just some examples of the diversity these scales demonstrate, which is quite remarkable since they all have the ambition to assess the same phenomenon: mindfulness. Furthermore, these questionnaires are either uncorrelated or only weakly to moderately correlated with each other (Chiesa, 2012).

Second, there seems to be a discrepancy between the Western view of the true meaning of mindfulness and the original Buddhist view, partly because the majority of the researchers

who have developed these measures are themselves more or less novices in meditation practice. Additionally, there is also a lack of contribution from experts in Buddhist theories in the development of these instruments (Grossman, 2008). Grossman (2008) stated that “mindfulness constructs in the behavioral literature, therefore, may be becoming hybrid concepts, only very partially reflecting any original meaning” (p. 406). Grossman’s (2008) apprehensions have recently gained some empirical support from cross-cultural studies which show that the cultural validity for some measures is quite weak. For instance, American college students scored higher than Buddhist Thai monks on three of the four subscales of the KIMS (Baer et al., 2004) (Observing, Describing, Accepting), whilst the monks scored higher on one subscale only (Awareness) (Christopher, Christopher, & Charoensuk, 2009), and the authors finally concluded that “the KIMS may not be an appropriate scale to assess mindfulness among Thais” (p. 600). Thus, the results from these cross-cultural validation studies suggest significant differences on the view of mindfulness between Eastern and Western countries, and the cultural validity of these mindfulness scales may be weak in Eastern populations where Buddhism is the major religion.

Third, the meaning and understanding of some key words and phrases frequently used in these scales seem to be dependent on meditation experience. Regular terms like “noticing”, “paying attention”, “awareness”, and “judging” probably have a different meaning for an expert meditator compared to a student with no prior meditation experience at all (Grossman, 2008). The skill of being deeply focused on all the processes that take place in the mind while meditating is a result of rigorous long-term practice. An item like “I notice how foods and drinks affect my thoughts, bodily sensations, and emotions” (KIMS; Baer et al., 2004; FFMQ; Baer et al., 2006) may for an inexperienced student be semantically interpreted as a “general ability to notice that consuming certain drinks (like alcohol) or foods (possibly excessively) have particular physical or mental consequences. Such interpretations have little or no overlap

with mindful awareness of physical sensations during eating or drinking” (Grossman, 2008, p. 406).

Fourth, as mentioned above, consensus has not yet been attained among researchers about exactly what mindfulness is, and what it is not, which has resulted in self-report measures emphasizing different characteristics related to mindfulness practice. The state of mindfulness is not an objectively observable phenomenon, and the limitations of self-rating scales make it unclear “whether there is a concordance between how mindful we think we are and/or say we are, and our true level of mindfulness” (Grossman, 2008, p. 407). Thus, people in general are not aware of how mindful or mindless they truly are (Eberth & Sedlmeier, 2012). In the majority of mindfulness programmes (e.g. the MBSR programme) the participants are usually instructed to “notice” and to “pay attention” to, for example, bodily sensations and inner processes with an attitude of “acceptance”, “openness”, and/or “curiosity”. In other words, they are taught the semantic code of how to interpret and understand the above-mentioned keywords that are used on a regular basis in mindfulness practice. These keywords often appear repeatedly in self-report measures as well. A person who has just finished an eight-week mindfulness programme consequently knows for certain what the “right” answer is when filling in a mindfulness questionnaire. This could result in biased responses because of an overestimation of obtained mindfulness qualities which perhaps is more a reflection of what the person wishes to have achieved and/or what level of mindfulness he or she incorrectly assumes having reached after a mindfulness course (Grossman, 2008). Grossman (2008) further states that “it would seem impossible to conclude at this time that self-report scales accurately measure mindfulness” (p. 407).

## Models of mindfulness

### The Intention-Attention-Attitude (IAA) model

Bishop and colleagues (2004) proposed a two-component model of mindfulness: a) *Self-regulated attention* including three subcomponents: sustained attention, switching attention and inhibition of secondary elaborative processing of operations and sensations that arise in the ongoing stream of consciousness (the last subcomponent reflects an executive attention capacity); and b) an *Attitude* of openness, acceptance, and curiosity (Bishop et al., 2004).

Shapiro, Carlson, Astin, and Freedman (2006) have developed an ambitious theoretical three-component model of mindfulness, using Kabat-Zinn's (1994) definition of mindfulness (cited earlier in this thesis) as a starting point. Shapiro et al. (2006) regarded mindfulness basically as a process and their model consists of three interactive axioms: Axiom 1: *Intention* ("on purpose") is regarded as the personal motivational aspect of practising mindfulness, that is, why one practises mindfulness. By adding the intention axiom, Shapiro et al. (2006) have tried to incorporate an essential Buddhist aspect of meditation practice, namely, the importance of having a vision, which for Buddhists is enlightenment. Shapiro et al. (2006) argued that the reason why one meditates and what specific goals one tries to achieve by meditation practice is overlooked in contemporary mindfulness research but is nevertheless considered to be an essential part of the mindfulness concept. Axiom 2: *Attention* ("paying attention") is seen as the core of mindfulness, in content practically the same as the above-described first component of Bishop et al.'s (2004) model. Axiom 3: *Attitude* ("in a particular way") refers to those qualities that are present when paying attention, that is, *how* one attends. It is deemed as crucial for mindfulness to "colour" the "neutrality" of bare attention and pure awareness with so-called "mindfulness qualities" (kindness, curiosity, acceptance, openness, patience, compassion, non-striving). These qualities are believed to significantly contribute to

the attainment of mindfulness. Meditation practice without these helping qualities may instead be filled with intolerant judgements of thoughts and feelings (Shapiro et al., 2006).

In sum, mindfulness is seen as the simultaneous cyclic “moment-to-moment process” (Shapiro et al., 2006, p.375) consisting of three fundamental components of mindfulness; intention, attention, and attitude (IAA).

According to Shapiro et al. (2006), the three mindfulness components (IAA) taken together are theorized to lead to a meta-mechanism named *reperceiving*, which basically means to shift from a self-centred subjective perspective to an objective perspective. To non-judgementally attend to present inner and outer experiences makes it easier to mentally take a step back from the current experience and thereby create distance between the actual event and the experience as one perceives it. A distance, though, that Shapiro et al. (2006) emphasized is not a dissociative or a disconnected state. On the contrary, a dis-identification through reperceiving is associated with clarity and a far greater intimacy with present experiences. It is easier to fully and deeply experience every event in detail when self-centred judgements, analyses, and feelings are absent. Instead of being mentally and emotionally caught up in the experience one can, through the state of mindfulness, shift perspective and relate objectively to the event itself as well as to one’s own cognitive and emotional reactions associated with experiencing the event. Shapiro et al. (2006) stated that reperceiving simply is a natural developmental process similar to the small child’s self-centred and largely subjective view of the world. This subjective view of the world gradually changes as the child grows older. An eight-year-old, for instance, is generally able to take another person’s perspective and view the world more objectively.

Reperceiving is hypothesized to lead to four additional mechanisms that in turn are believed to be important contributors to the beneficial health effects of mindfulness interventions: (1) *Self-regulation and self-management*. Reperceiving is believed to increase

the ability to self-regulate one's behaviour in more adaptive and health-related ways, as opposed to automatic reactive behavioural responding. Shapiro et al. (2006) meant that intention and attention lead to a "connection" which in turn leads to enhanced self-regulation and thereby to improved order and health. It should be pointed out that Shapiro et al. (2006) do not specify exactly what is connected with what in this process. Moreover, it is not explained why the attitude component is not considered to be a necessary element in this process. What is stated is that, by attending to thoughts, emotions, and events from an objective perspective without attaching to them or being drawn into them, one no longer needs to be controlled by them. (2) *Values clarification*. Personal values are often conditioned by social, religious, and cultural factors. A shift of perspective gives the opportunity to observe and reflect on values from an objective point of view, which may generate a greater capacity to discover one's inner true values and make it possible to choose the values one really wants to live by. (3) *Cognitive, emotional and behavioural flexibility*. Reperceiving is believed to enhance a greater flexibility and freedom when responding to experiences. Thus, this mechanism seems to be closely related to behavioural self-regulation and the difference between them is not clearly specified. (4) *Exposure*. Through the process of reperceiving it is possible to observe and explore difficult and strong emotions that are normally avoided or denied. By observing emotions and thoughts, a person is hypothesized to be better able to experience these feared emotions with less reactivity. The person might also realize that these strong emotions sooner or later diminish. The realization of the impermanent nature of emotions eventually leads to a greater tolerance and an enhanced capacity to handle various emotions, thoughts, and experiences that previously have been feared or avoided (Shapiro et al., 2006).

Insert Figure 1

The function of re-perceiving is definitely not a new phenomenon. Several similar concepts closely related to re-perceiving can be found in earlier literature, for instance, *decentering*, described as an opportunity to "step outside of one's immediate experience, thereby changing the very nature of that experience. This process allows for the introduction of a gap between the event and one's own reaction to that event. By developing the capacity to observe oneself and one's own reactions, one begins to distinguish between reality and reality as one construes it" (Safran & Segal, 1990, p. 117). Decentering and re-perceiving seem to be synonymous concepts and it is not clearly expressed why Shapiro et al. (2006) felt it necessary to introduce a new term. A decentered perspective, as exemplified by Fresco et al. (2007), is to "say, 'I am thinking that I feel depressed right now' instead of 'I am depressed'" (p.234).

Similar concepts also emphasizing a shift from a subjective to an objective perspective are, among others, *deautomatisation* (Deikman, 1982; Safran & Segal, 1990) and *cognitive defusion* (Hayes et al., 1999). Thus, the fundamental function that all of these concepts share is a dis-identification from cognitive, emotional, physical, and experiential contents. Thereby, a radical change of the relationship to these inner activities occurs. Simply observing cognitive and emotional operations without identifying with them generates a fundamental insight about the impermanence of these processes, an insight that in turn leads to a realisation of the impermanent nature of the self as well, that is, of what is actually *me*. All those attributes, views, beliefs, attitudes, "stories", and so on that comprise what previously has been regarded as a stable general self-construct, the one who *I* truly am, are viewed as impermanent, ever-changing stimuli in the constant ongoing stream of consciousness. As a result, the self starts to be deconstructed and reorganized, and "identity begins to shift from the contents of awareness to awareness itself" (Shapiro et al., 2006; p. 379), a notion that is

shared by Kang and Whittingham (2010). This is similar to what Tolle (2003) refers to as being a witness to one's thoughts.

These ideas can also be traced back to the ground-breaking work of Deikman (1982) who describes an underlying, superior consciousness called *the Observing Self*, which precedes cognitive and emotional operations, and is thus separated from and situated behind or beyond the cognitive, the emotional, and the physical parts of the human being. This observing consciousness is the actual awareness that experiences all these inner and outer processes.

### **Empirical support for the IAA-model**

To empirically examine the mindfulness mechanisms proposed by Shapiro et al. (2006), Carmody and colleagues (2009) studied the relation between changes in self-reported mindfulness, reperceiving, as measured by the Experience Questionnaire (EQ; Fresco et al., 2007), designed to assess decentering<sup>1</sup>, and the four additional mechanisms (self-regulation, values clarification, cognitive, emotional and behavioural flexibility, and exposure) in MBSR-participants. In line with the predictions, significant increases in mindfulness, reperceiving and the four potential mechanisms were found after the MBSR-programme whilst psychological symptoms and stress were, as expected, significantly reduced. Mediation analyses did not, however, support a sequential model where increases in mindfulness lead to enhanced reperceiving which in turn leads to improved abilities concerning the four additional mechanisms. Thus, reperceiving did not mediate the relations between mindfulness and self-regulation; values clarification; cognitive, emotional, and behavioural flexibility; and exposure. On the other hand, values clarification as well as cognitive, emotional and behavioural flexibility partly mediated the relation between a composite mindfulness/reperceiving variable and reductions in psychological symptoms. Carmody et al.

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<sup>1</sup> Throughout this paper, the term decentering will be used instead of reperceiving.



(2009) hypothesize that the lack of support was probably due to the fact that the measures used to assess mindfulness and reperceiving were highly correlated. For that reason the authors concluded that mindfulness and reperceiving, as measured by the FFMQ and the EQ respectively, are exceedingly overlapping constructs (Carmody et al., 2009). Further, the intention component proposed by Shapiro et al. (2006) to be an essential part of the mindfulness construct also received very little support in Carmody et al.'s (2009) correlational analyses between pre-MBSR intentions and change in dependent variables such as perceived stress.

### **A Buddhist psychological model (BPM)**

Grabovac, Lau, and Willet (2011) introduced a new theoretical model, based on psychological theories and insight meditation practices (Vipassana) in the tradition of Theravada Buddhism, in an effort to explain what mechanisms are responsible for positive health outcomes due to MBIs. The theory proposes that the major mechanism for psychological symptom reduction and increased well-being is *decreased mental proliferation*. Mental proliferation is described as the “habitual reactions of attachment and aversion to the pleasant, unpleasant, and neutral feelings of prior sense impressions and mental events” (Grabovac et al., 2011, p. 157). Strong reactions may result in increased mental proliferation, which in turn may lead to rumination. Furthermore, the theory states that fundamental insights about three characteristics lead to reductions in attachment and aversion to mental and emotional contents, which in turn result in decreased mental proliferation. The three characteristics are (i) the *impermanence* of mental events and sense impressions, (ii) *attachment* and *aversion* to mental events and sense impression as well as not being aware of them leading to suffering, (iii) *not-self*: “sense impressions and mental events do not contain or constitute any lasting, separate entity that could be called a self” (Grabovac et al., 2011, p. 156). Hence, habitual attachment or aversion

to pleasant, unpleasant, or neutral feelings of mental events and sense impressions leads to increased mental proliferation, which in turn leads to rumination and eventually a certain degree of suffering. Improvements in well-being and psychological health are probably due to reductions in attachment and aversion, leading to decreased mental proliferation. Put differently, decreased mental proliferation occurs when one lets current contents of the mind (thoughts, feelings, images, etc.) arise and fade away without any conscious or unconscious attempt to hold on to or suppress any of them.

In addition to insight about the three characteristics followed by reduced attachment/aversion, three aspects of meditation practice (*acceptance, ethical practices, and concentration/attention regulation*) also contribute to the attainment of reduced mental proliferation.

Acceptance in meditation practice is primarily used as a tool to undermine negative thoughts (and aversion) related to the demanding task of keeping the attention firmly focused on the meditation object. This is especially important for the beginner, who normally needs to redirect the frequently lost attention to the chosen object over and over again. Acceptance in this context does not include any cognitive elaboration; it is rather a quality of awareness. In meditation practice, an “accepting awareness”, as opposed to a “non-accepting awareness”, does not enhance judgemental thoughts when, for instance, attention has been lost (again) on the meditation object. In contrast to previously mentioned theories (Bishop et al., 2004, Shapiro et al., 2006), Grabovac and colleagues (2011), as well as Mikulas (2010), carefully stressed that attitudinal components such as acceptance and non-judging are not part of the mindfulness construct; they are simply aspects of meditation practice. Moreover, Mikulas (2010) made a strong point, arguing that “mindfulness has nothing to do with accepting or rejecting; mindfulness is simply observing any accepting or rejecting that is done by some other part of the mind” (p. 3).

Adding ethical aspects to meditation practice may lead to less unwholesome/unhealthy mind contents and behaviours, which may undermine further development of mental proliferation. Thus, leading an unethical life easily produces thoughts and feelings (e.g. shame, guilt, worry, helplessness, etc.) that may stimulate and increase mental proliferation.

The purpose of concentration/attention regulation in meditation practice is to sustain attention to a chosen meditation object. As long as attention remains sustained on the object, mental proliferation is blocked. However, this disruption is rather short-lived, and when attention is lost on the object, mental and emotional activities, followed by mental proliferation, can resume.

Insert Figure 2

In sum, the BPM proposes that mindfulness practice generates insights about the three characteristics described above. Insights in turn result in decreased attachment and aversion to sense impressions, thoughts and feelings, which subsequently leads to the main mechanism: decreased mental proliferation. Additional mechanisms, related to meditation practice, also contribute to decreased mental proliferation: acceptance, concentration/attention regulation, and ethical practices.

### **Methods in mindfulness meditation**

So far, the present paper has introduced the concept of mindfulness in a theoretical context. In this section, the methods and techniques associated with mindfulness practice will be briefly described.

The essence of meditation is often described as attention control training (Claxton, 1987), and mindfulness is a fundamental element in all Buddhist meditation practices (Kabat-Zinn,

2003; Thera, 1996). Meditation has a broad range of techniques aiming at various goals, such as relaxation and well-being. However, the all-embracing goal in Buddhist practice is enlightenment/awakening (Mikulas, 2010). Buddhist meditation teachers Joseph Goldstein and Jack Kornfield (2001) referred to mindfulness training as insight meditation. Insight meditation stems from the Theravada Buddhist tradition of Vipassana meditation, and the pali word Vipassana is often translated as insight (Gunaratana, 1990) and explained as a form of “clear seeing in new, varied, and extraordinary ways” (Mikulas, 2010, p. 2). Generally, Vipassana meditation is described as a practice of seeing things exactly as they are (Al-Hussaini et al., 2001; Marlatt et al., 2004). Insight meditation is also regarded as a “key practice in the development of wisdom” (Gethin, 2011, p. 267). This form of meditation practice starts with paying attention to the breath as the primary object of focus and then, as carefully as possible, noticing whatever it is that arises in the mind, for instance, body sensations, sounds, images, emotions, and thoughts, without evaluation and without getting caught up in them. When these kind of different objects arise in the mind, they themselves are turned into meditation objects. The next step is to notice what happens when the current object, for instance, an emotion or a thought, is being observed. When this object fades away, which it inevitably will, attention returns to the breath until the next sensation arises, which then will be the next object of thorough examination and full attention (Goldstein & Kornfield, 2001).

Based on Buddhist meditation traditions, Lutz, Slagter, Dunne and Davidson (2008) made a distinction between two meditation types: focused attention meditation (FA meditation)<sup>2</sup> and open monitoring meditation (OM meditation). OM meditation “involves nonreactively monitoring the content of experience from moment to moment, primarily as a means of recognizing the nature of emotional and cognitive patterns” (Lutz et al., 2008, p.163). In

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<sup>2</sup> FA meditation is defined as “voluntary focusing attention on a chosen object in a sustained fashion” (Lutz et al., 2008, p. 163)

accordance with Lutz et al.'s (2008) definitions, mindfulness meditation belongs to the OM meditation group, while concentration meditation such as transcendental meditation belongs to the FA meditation group.

It should be recognized that MBIs usually contain a combination of mindfulness techniques (OM meditation) and concentration techniques (FA meditation) (Grabovac, Lau, & Willett, 2011; Mikulas, 2010). Furthermore, Mikulas (2010) makes a convincing case, arguing that Western conceptualisations of mindfulness as well as certain mindfulness exercises should be categorized as concentration-based rather than mindfulness.

Concentration (Samatha) is mainly a practice of attention-regulation whereas mindfulness (Vipassana) is more of an insight-oriented practice (Grabovac et al., 2011). All Buddhist-related meditation contains elements of both concentration and mindfulness, and these two often interact and stimulate one another (Mikulas, 2010). However, concentration is a skill that is especially important for beginners to develop, because concentration calms the mind and helps the practitioner to establish a focused attention on the meditation object, that is, the breath (Goldstein & Kornfield, 2001; Grabovac et al., 2011; Mikulas, 2010). Thus, according to this distinction between concentration and mindfulness, as proposed by the Buddhist-influenced researchers Mikulas (2010) and Grabovac and colleagues (2011), common, standard MBI exercises such as attention to the breath, attention to sensory processes and perceptions (sounds, sights, smell, taste) as well as attention to the body (so-called body scan), could be considered to be concentrative practices, at least for inexperienced meditators who are not yet skilled enough to be mindfully aware of these meditation objects. Further, the cultivation of mindfulness, as practised in pure mindfulness techniques (observation and awareness of internal processes such as mental and emotional contents and operations), leads to insight, "a direct, nonconceptual understanding" (Grabovac et al., 2011, p. 159).

## **Mindfulness and psychological well-being**

Research on well-being started partly as a reaction to the great emphasis psychological research traditionally has placed on psychopathology, illness and dysfunctional states (Diener, Suh, Lucas, & Smith, 1999; Ryff, 1989). It was argued that well-being should not simply be categorized as the absence of mental illness, and further, that people do not merely avoid unpleasant experiences but tend to actively seek positive incentives as well (Diener et al., 1999; Keyes, Shmotkin, & Ryff, 2002; Ryff & Singer, 1998).

Research on well-being derives from two major philosophical views: the hedonic perspective and the eudaimonic perspective. The former perspective focuses mainly on subjective happiness and views well-being as gaining pleasure and avoiding pain, while the latter perspective sees well-being as realizing and fulfilling one's true and inner capacity. The hedonic perspective is represented principally by the concept of subjective well-being (SWB) (Ryan & Deci, 2001) which emerged in the late 1950's. Research on well-being continued to expand during the 1960's by the pioneering work of Warner Wilson and Norman Bradburn, among others (Diener et al., 1999; Keyes et al., 2002). SWB contains two emotional components, pleasant affect and unpleasant affect, as well as two cognitive components, life satisfaction and domain satisfaction (Diener et al., 1999). The presence of pleasant affect in combination with the absence of unpleasant affect is generally categorized as *happiness* (Ryan & Deci, 2001). Life satisfaction refers to satisfaction with past, current and future life as well as significant others' view of one's life, whereas domain satisfaction covers such areas as work, family, leisure, health, finances, the self, and one's group (Diener et al., 1999). However, the concept of subjective well-being has been challenged and criticized by Ryff (1989b), who stated that previous work had paid far too little attention to understanding what psychological well-being fundamentally means. Ryff (1989b) argued that previous work on well-being has not been sufficiently theory-driven. For instance, research on positive and

negative affect (Bradburn, 1969) as well as research on life satisfaction (Neugarten, Havighurst & Tobin, 1961) was designed for purposes other than to define the essential elements of psychological well-being. As a result, other important aspects of positive psychological functioning were left out in previous research (Ryff, 1989b; Ryff & Keyes, 1995). In other words, happiness and life satisfaction should not be regarded as the only features of psychological well-being. Ryff (1989a; 1989b) mainly based her operational definition of psychological well-being on concepts and theories from the field of phenomenology, that is, self-actualization (Rogers, 1951; Maslow, 1968), and from the life-span developmental area of research, Erikson's (1959) psychosocial model and Neugarten's (1968) theory of personality change among others. In addition, Jahoda's (1958) criteria for what constitutes mental health have also influenced Ryff's (1989a; 1989b) concept of psychological well-being.

According to the eudaimonic view, well-being is not merely seeking and finding subjective short-term happiness; rather, it is more about finding meaning in life and living in congruence with one's true self and thereby gaining self-actualization and personal growth (Ryan & Deci, 2001). In line with the eudaimonic tradition, Ryff (1995) regards well-being as "the striving for perfection that represents the realization of one's true potential" (p. 100). Ryff and colleagues proposed an integrated, multidimensional model of psychological well-being (PWB) consisting of six underlying dimensions: *self-acceptance*, defined as a "central feature of mental health as well as a characteristic of self-actualization, optimal functioning, and maturity" (Ryff, 1989b; p. 1071); *positive relations with others*, the capacity to engage in good and trusting interpersonal relationships and the ability to love are also features vastly important to mental health; *autonomy*, which includes "such qualities as self-determination, independence, and the regulation of behaviour from within" (Ryff, 1989b, p. 1071); *environmental mastery*, also seen as essential to positive functioning and mainly referring to

personal competence and “the individual’s ability to choose or create environments suitable to his or her psychic conditions” (Ryff, 1989, p. 1071); *purpose in life*, a component containing a general belief of meaningfulness in life and a sense that one’s own life has a purpose which helps the person to establish goals and directions in life; *personal growth*, which refers to the continuation of growth, personal development and self-realisation as opposed to stagnation (Ryff, 1989a; Ryff, 1989b; Ryff & Keyes, 1995; Ryff & Singer, 1998).

The Buddhist view of well-being is not related to the hedonic perspective, with its dependence on the pleasures of temporary external and internal stimuli. Instead, seeking happiness and well-being by clinging on to materialistic things, events, and experiences could on the contrary lead to sadness or even anxiety (Wallace & Shapiro, 2006). Similar to Ryff’s (1995) definition, true and genuine well-being according to the Buddhist perspective derives from mental balance and “realizing one’s fullest potential in terms of wisdom, compassion and creativity” (Wallace & Shapiro, 2006, p. 691). Genuine well-being and enduring happiness could be translated as the Buddhist term “sukha” (Sanskrit), which is defined by Ekman, Davidson, Ricard and Wallace (2005) “as a state of flourishing that arises from mental balance and insight into the nature of reality” (p. 60). The way to attain sukha is “sustained training in attention, emotional balance, and mindfulness, so that one can learn to distinguish between the way things are as they appear to the senses and the conceptual superimpositions one projects upon them” (Ekman et al., 2005, p. 60). Sukha seems to be related to Shapiro et al.’s (2006) proposed mindfulness mechanism, *reperceiving*. Hence, well-being from a Buddhist perspective is clearly related to the eudaimonic view, and thus also partly to Ryff’s (1989a; 1989b) well-being concept where elements such as self-actualization, personal development, meaningfulness in life and mental balance are emphasized.



Mindfulness is thought to enhance psychological well-being primarily in two ways. First, as previously mentioned, mindfulness is hypothesized to improve health and well-being indirectly by a greater capacity for self-regulation (Brown et al., 2007). Second, mindfulness is believed to enhance well-being directly since mindfulness is regarded to be a high quality state in itself, associated with joy, vitality, and clarity (Brown & Ryan, 2003; Brown et al., 2007). The Buddhist perspective emphasizes that one fundamental function of mindfulness is its ability to calm and balance the mind, even in difficult situations of fear and pain (Goldstein & Kornfield, 2001).

A central hypothesis in research on mindfulness is that increased mindfulness should lead to improved psychological well-being. Consistent with this hypothesis, several studies have reported that mindfulness-based treatment programmes have been associated with reductions in a variety of psychopathological indicators (e.g. Grossman, Niemann, Schmidt, & Wallace, 2004; Reibel, Greeson, Brainard, & Rosenzweig, 2001), stress (e.g. Tang et al., 2007), and inversely, with enhancements in well-being (e.g. Carmody & Baer, 2007). Baer et al. (2008) found that all FFMQ scales correlated with psychological well-being in a meditating population, as measured by the Psychological Well-Being total scale (PWB; Ryff, 1989); and that all FFMQ-scales with the exception of Observe were related to psychological well-being in non-meditating samples.

To test the hypothesis that meditation experience is associated with higher levels of psychological well-being and that mindfulness mediates this relationship, Baer et al. (2008) conducted mediation analyses including those mindfulness facets (i.e. all facets except Acting with Awareness) that were significantly correlated with both meditation experience and psychological well-being, as potential mediators. Since age, education, and occupation were significantly related to mindfulness, these variables were controlled for. The results indicated that the relation between meditation and psychological well-being was mediated by the four

mindfulness facets Observing, Describing, Non-Reactive and Non-Judging, which is consistent with the hypothesis that meditation experience cultivates mindfulness skills which in turn improves psychological well-being. As the authors point out, however, because of the cross-sectional design of the study, the results cannot be said to directly support this hypothesis, as compared with other, alternative models (e.g. baseline levels of mindfulness or well-being increasing the likelihood of maintaining a meditation practice). In a longitudinal study that was more apt to test the hypothesis, Carmody and Baer (2007) found that participants in an MBSR programme increased their psychological well-being as well as their self-reported mindfulness (FFMQ); furthermore, both the increased FFMQ-scores and meditation practice time, significantly predicted PWB. Moreover, increases in mindfulness were found to mediate the relationship between meditation practice time and improved psychological well-being, suggesting that the practice of mindfulness meditation leads to increases in mindfulness, which in turn enhance well-being. Similar associations between mindfulness and enhancements in psychological well-being have been reported with another measure of mindfulness, the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). Thus, of the few studies conducted on self-reported mindfulness and psychological well-being, results so far indicate that mindfulness and meditation experience is related to a higher level of psychological well-being, and further, that mindfulness mediates the relation between meditation experience and psychological well-being. Further examination of the relation between meditation experience, mindfulness, and psychological well-being could add important information regarding this process and may clarify which mindfulness facets are related to meditation experience and psychological well-being respectively.

## **The effects of mindfulness based interventions on psychological health**

Mindfulness-based interventions (MBIs) have, during the last decade, gained increased popularity among a wide range of professionals in various fields (Cullen, 2011). Treatment programmes integrating mindfulness meditation techniques in a clinical context, such as Mindfulness Based Stress Reduction (MBSR; Kabat-Zinn, 2004), Mindfulness Based Cognitive Therapy, (MBCT; Segal et al., 2002), Acceptance and Commitment Therapy, (ACT; Hayes, Strosahl, & Wilson, 1999), and Dialectical Behavioral Therapy, (DBT; Linehan, 1993) have been rapidly established in Western clinical and medical health care settings. Additionally, recent trends show an increasing interest in developing tailored mindfulness-based interventions for specific populations, for instance Mindfulness Based Childbirth and Parenting, Mindfulness Based Eating, Mindful Leadership, and so on (Cullen, 2011).

Correlational studies frequently show that mindfulness meditation as well as self-reported mindfulness are positively related to mental health and well-being, and inversely associated with psychological symptoms such as depression and anxiety (Baer et al, 2008; Cash & Whittingham, 2010; Keng, Smoski, & Robins, 2011). Meta-analyses and reviews investigating the effects of MBIs similarly show overall improvements in mental health and psychological well-being, especially reductions in stress, anxiety, and depression, in clinical as well as in non-clinical populations (Carmody & Baer, 2009; Chiesa & Serretti, 2009; Fjorback, Arendt, Örnblom, Fink, & Walach, 2011; Grossman, Niemann, Schmidt, & Walach, 2004; Hofman, Sawyer, Witt, & Oh, 2010; Keng et al., 2011). A meta-analysis by Hofman et al. (2010), examining the effects of mindfulness-based therapies, showed moderate pre- to post-test effect sizes on improvements in anxiety ( $g = 0.63$ ) and depressive symptoms ( $g = 0.59$ ) in the overall sample whereas the effect sizes were large when a clinical sample consisting of patients with anxiety disorders ( $g = 0.97$ ) and depression ( $g = 0.95$ ) was

analysed. Moreover, the most recently published meta-analysis studied the effects of MBSR as well as “pure” mindfulness meditation (for instance, as practiced in Buddhist settings) on several variables, among them, stress, psychological health, self-concepts, emotion regulation, and mindfulness (Eberth & Sedlmeier, 2012). Subanalyses on the mindfulness meditation trials and the MBSR trials, respectively, revealed great differences between effect sizes across variables. In general, MBSR was associated with larger effect sizes compared to mindfulness meditation. The largest effect size found in mindfulness meditation was improved self-reported mindfulness ( $d = 0.73$ ). In the analysis of the MBSR trials, reductions in stress ( $d = 0.78$ ) and improved well-being ( $d = 0.80$ ) showed the largest effect sizes. The authors partly related the above results to ceiling effects, because pure mindfulness meditation (compared to MBSR) may attract a more psychologically healthy population, including experienced meditators whose goal may not primarily be symptom reduction but, for instance, greater wisdom. Consequently, improvements in psychological health for these meditators may be quite limited. Hence, MBSR appears to have its greatest effects on reduced stress and increased well-being, whilst mindfulness meditation principally improves self-reported mindfulness. The authors finally conclude that MBSR effects seem to be related to features other than merely mindfulness meditation, for instance psychoeducation and expectations (Eberth & Sedlmeier, 2012).

Research on the effect of MBIs on mental health has mostly been carried out on clinical populations and populations with medical diagnoses (e.g. Ramel, Goldin, Carmona, & McQuaid, 2004; Bohlmeijer, Prenger, Taal, & Cuijpers, 2010; Williams, Crane, Fennell, Duggan, Hepburn, & Goodwin, 2008). Far less empirical attention has been paid to the potential benefits for a healthy, average population. A review by Chiesa and Serretti (2009) revealed that MBSR was effective in reducing stress in healthy subjects compared to inactive controls. In addition, studies published after the Chiesa and Serretti (2009) review showed

that MBCT can reduce anxiety and depression in students compared to a waitlist control group (Kaviani, Javaheri, & Hatami, 2011), and a Mental Silence Meditation (MSM) intervention significantly reduced stress and depressive symptoms in working adults compared to no-treatment controls (Manocha, Black, Sarris, & Stough, 2011). Consequently, though not without controversy (Toneatto & Nguyen, 2007), the vast majority of reviews and meta-analyses come to the conclusion that MBIs could be recommended for improving mental health and psychological well-being in clinical as well as in non-clinical populations (Chiesa & Serretti, 2009; Fjorback et al., 2011; Hofman et al., 2010).

Several researchers have highlighted the lack of active control groups in most of the trials, suggesting that the effects obtained are a result of non-specific unknown variables (Canter, 2003; Chiesa, 2012; Chiesa & Serretti, 2009; Fjorback et al., 2011; Toneatto & Nguyen, 2007; Manocha et al., 2011). To be able to detect the unique effects of multi-model MBIs, it is necessary to use a research design with active controls (Canter, 2003; Manocha et al., 2011; Toneatto & Nguyen, 2007). Of the very few studies that have compared an MBI with an active control group, the initial results are less impressive. MBSR as an adjunct to treatment as usual (TAU) had no additional treatment effect compared to TAU alone in psoriasis patients (Kabat-Zinn et al., 1998). Similarly, no additional effect was found when MBSR combined with psychotherapy was compared with psychotherapy alone in an outpatient sample (Weiss, Nordlie, & Siegel, 2005).

It has specifically been stressed that MBI should be compared with relaxation training in order to separate mindfulness effects from mere relaxation or resting (Jain, Shapiro, Swanick, Roesch, Mills, Bell, & Schwartz, 2007; Manocha et al., 2011), especially since relaxation training also has been associated with reductions in depressive symptoms, anxiety and distress (Jorm, Morgan, & Hetrick, 2008; Manzoni, Pagnini, Castelnuovo, & Molinari, 2008; Murphy, Carney, Knesevich, Wetzel, & Whitworth, 1995; Reynolds & Coats, 1986; Stetter & Kupper,

2002). In other words, can specific MBI effects be distinguished from simple relaxation effects? To my knowledge, only four studies comparing MBI and relaxation training have thus far been published, and the results have been mixed. Jain et al. (2007) found no significant differences between MBI and relaxation in stress, positive states of mind, and rumination in a student sample. Similarly, no group differences between MBI and progressive relaxation training were found on anxiety and mood states in a sample consisting of community adults (Semple, 2010). On the other hand, Tang et al. (2007) found that a one-week MBI significantly decreased stress, anxiety, and depressive symptoms in students compared to a relaxation condition. As previously mentioned, Manocha et al. (2011) found that MSM significantly reduced occupational stress and depressive symptoms, but not anxiety, compared to relaxation, thus suggesting some unique effects associated with meditation. The authors hypothesized that “mental silence” (reductions of cognitive activity) may be not only a specific effect, but also a more efficacious ingredient in stress reduction than the relaxation aspect of meditation (Manocha et al., 2011). Investigating specific effects of mindfulness interventions may contribute considerably to the understanding of mindfulness mechanisms.

### **The relation between the length of the MBI programme and outcomes**

The standard form of the eight-week MBSR programme consists of 26 hours of class time. The programme also includes a one-day class of six hours, thus 32 class hours in all (Carmody & Baer, 2009). In addition, the participants are instructed to practise at home for 45 minutes/day (Carmody & Baer, 2008). However, it has been reported that the considerable time commitment required of the MBSR-participants is a major reason for declining participation (Carmody & Baer, 2009). This has lead some researchers to address the question of how long a mindfulness-based programme has to be for positive mental health effects to

occur (Carmody & Baer, 2009). There is some preliminary evidence that even a short form of MBI could be beneficial, at least for stress and trait mindfulness. Klatt, Buckworth, and Malarkey (2008) examined the effects of a low-dose six-week MBSR, consisting of a one hour session/week and 20 minutes home practice on the remaining working days, in a full-time working-population. The results showed significant pre- to post-test improvements in self-reported mindfulness (the MAAS) and reductions in stress for the MBSR group, but not for the control group. Furthermore, the recently published review by Keng et al. (2011) revealed that several laboratory studies showed that just a single brief mindfulness-induced session can result in immediate positive effects on emotion regulation and anxiety (e.g. Erisman & Roemer, 2010; Feldner, Zvolensky, Eifert, & Spira, 2003).

If a short form of MBI can produce positive health effects, this may be a more realistic and attractive alternative for certain populations who already have a fully occupied and strained schedule, for instance parents working full-time. Clearly, future studies investigating the effects of short MBIs are necessary.

### **Mindfulness and attention**

William James (1890) defined attention as “the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought” (p. 403). Furthermore, James (1890) seemed convinced that attentional control has a vast impact on the individual’s personal identity, behaviour, experience, and health, considering his statement that “each of us literally chooses, by his ways of attending to things, what sort of universe he shall appear to himself to inhabit” (p.424). According to LaBerge (1995) the goals of attention are “accurate perceptual judgements and actions” (p. 9), “speeded perceptual judgements and actions” (p.10) and “sustained processing of a mental activity” (p.11), and these goals manifest themselves in behaviour and cognition as *selection*

of attention, *preparation* of attention, and *maintenance* of attention (LaBerge, 1995). In the constant flow of incoming information one needs to be selective and actively pay attention to relevant information while ignoring or inhibiting other distracting or competing information regarded as irrelevant. Preparation of attention for an expected stimulus or action before it takes place increases the speed of processing compared to unexpected stimulus and actions without preparatory attention. Maintenance refers to the ability to sustain attention “to an object or thought in the absence of any psychological reason other than the intrinsic character of the object itself” (LaBerge, 1995, p. 97). Regarding theories of mindfulness, *selection* is closely related to the inhibition subcomponent of self-regulated attention, while *maintenance* is strongly connected to the sustained attentional subcomponent (Bishop et al., 2004; Shapiro et al., 2006). Posner and Peterson (1990) proposed three separate cognitive attentional networks, *orienting*, *alerting*, and *conflict monitoring*. Orienting refers to direction and selection of information from all available sensory inputs, alerting is a vigilant state of preparedness and sustained attention, and conflict monitoring means monitoring between competing stimuli and responses (e.g. in a cognitive conflict), reflecting executive attention. Alerting attention is synonymous with the sustained attention part of self-regulated attention, while conflict monitoring is related to inhibition of elaborative secondary processing as described in Bishop et al.’s (2004) and Shapiro et al.’s (2006) models of mindfulness.<sup>3</sup>

As previously described, attention is widely regarded as an essential feature in mindfulness conceptualizations (Bishop et al., 2004; Brown & Ryan, 2003; Shapiro et al., 2006). Moreover, mindfulness meditation is often described as a practice in attentional control (e.g. Claxton, 1987; Thera, 1996; Thera, 1972). Despite the fact that it is repeatedly claimed that mindfulness training improves self-regulated attention (e.g. Bishop et al., 2004; Shapiro et al., 2006), relatively few studies have in fact investigated the effect of MBIs on objective

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<sup>3</sup> Throughout this article, for the sake of clarity, the term alerting attention will be referred to as sustained attention and conflict monitoring will be referred to as executive attention.



measures of attention regulation. The assumed relation between mindfulness and attention has, however, gained strong support in the neuropsychological line of research. Several studies investigating meditation and cognition have shown superior performance in attention-related brain activation and processing, as well as changes in brain structure in experienced meditators compared to controls: for instance, highly experienced Tibetan Buddhist meditators showed superior visual cognition in a binocular rivalry task (Carter et al., 2005). In Lutz, Greischar, Rawlings, Ricard, and Davidson's (2004) study, experienced Tibetan Buddhist meditators showed higher baseline resting EEG coherence, which further strongly increased during meditation and then remained higher after meditation than on the initial baseline level. Less age related decline in grey matter volume in the putamen was detected in Zen meditators, a region of the brain associated with cognitive flexibility and attentional processing (Pagnoni & Cekic, 2007). Concentrative meditators showed superior performance in pre-attentive processing (Srinivasan & Baijal, 2007). Reductions in P3a amplitude were found in Vipassana meditators, reflecting decreased automated reactivity and evaluative processing of task-irrelevant, attention-demanding stimuli (Cahn & Polich, 2008). Similarly, Zen practitioners showed a reduced duration of neural responses linked to conceptual processing in regions of the default network (Pagnoni, Cekic, & Guo, 2008). Moreover, brain regions associated with attention were thicker in long-term meditators compared to controls (Lazar et al., 2005). Slagter et al. (2007) showed that Vipassana meditators performed significantly better after a three-month retreat than non-meditators on an attentional blink task. Brefczynski-Lewis, Lutz, Chaefer, Levinson, and Davidson (2007) found that Tibetan Buddhist expert meditators with an average of 19 000 hours of practice had more activation in brain regions associated with sustained attention than non-meditators, while expert meditators with an average of 44 000 hours of practice had less activation than non-meditators. The authors conclude that this inverted U-shape can be explained by the possibility that a very

large amount of meditation practice successively requires less attentional effort and thereby less attentional activation is needed. Non-meditators also showed more activation in brain regions known to be negatively correlated with achievements in sustained attention tasks than expert meditators (Brefczynski et al., 2007).

### **Sustained attention**

A review by Chiesa, Calati, and Serretti (2011) revealed that only two of seven included trials indicated that sustained attention was improved after a mindfulness intervention (Chambers, Lo, & Allen, 2008; Jha, Krompinger, & Baime, 2007). Jha et al. (2007) investigated sustained (and executive) attention in (i) experienced FA meditators taking part in a one month mindfulness retreat; (ii) an MBSR group consisting of participants with no prior meditation experience, and (iii) a control group. After the intervention, the mindfulness retreat group improved significantly in sustained attention on reaction time, but not on accuracy scores compared to the MBSR group and controls. Since the mindfulness retreat group consisted of experienced FA meditators, it is difficult to draw any conclusions about the specific effects of mindfulness meditation on sustained attention. Five other intervention trials did, however, show that mindfulness meditation does not improve sustained attentional performance compared to controls (Anderson, Lau, Segal, & Bishop, 2007; Cusens, Duggan, Thorne, & Burche, 2010; Mcmillan, Robertson, Brock, & Chorlton, 2002; Polak, 2009; Tang et al., 2007). It should be mentioned though that the interventions in Tang et al. (2007) and Polak (2009) consisted of only five and two meditation sessions, respectively. In studies that compared experienced meditators with non-meditating control groups on performance on sustained attention tasks, mixed results were also found. Valentine and Sweet (1999) found that meditators (8 mindfulness meditators and 11 FA meditators) performed significantly better than non-meditators did on a sustained attention task, and that long-term meditators

performed better than short-term meditators, which suggests a positive correlation between length of meditation experience and sustained attention ability. Similarly, Van den Hurk, Giommi, Gielen, Speckens, and Barendregt (2010) showed that experienced Vipassana meditators performed better than controls on a computerized sustained attention test. On the other hand, neither Pagnoni and Cekic (2007) nor Lykins, Baer, and Gottlob (2010) found any significant differences between meditators and non-meditators in performance on sustained attention tasks.

In the above studies, different attentional instruments were used. The computerized Attention Network Test (ANT; Fan, McCandliss, Sommer, Raz, & Posner, 2002) was used in four studies (Jha et al. 2007; Polak, 2009; Tang et al., 2007; Van den Hurk et al., 2010). Valentine and Sweet (1999) used the Wilkins' Counting Test (Wilkins, Shallice, & McCarthy, 1987), Pagnoni and Cekic (2007) used the computerized test Rapid Visual Information Processing (RVIP; Sahakian & Owen, 1992), and Lykins et al. (2010) used the Continuous Performance Task (CPT; Lawrence et al., 2005).

A study of self-reported mindfulness and performance on sustained attention tasks in a student sample (Schmertz, Anderson, & Robins, 2009) showed that a high level of self-reported mindfulness was associated with better sustained attentional performance on one instrument (CPT-II) but not on another (PASAT). High scorers on the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) as well as on the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007) had fewer target omissions than low scorers on a computerized sustained attention task, the CPT-II (Conners, 2002), (Schmertz, Anderson, & Robins, 2009). Likewise, Cheyne, Carriere, and Smilek (2006) found high scores on the MAAS to be correlated with fewer errors on another computerized sustained attention test, the Sustained Attention to Response Test (SART; Robertson, Manly, Andrade, Baddeley, & Yiend, 1997). No significant relations

were found between CPT-II reaction time and self-reported mindfulness scores (Schmertz et al., 2009). Further, Schmertz et al. (2009) found no significant associations at all between self-reported mindfulness and sustained attention as measured by the PASAT (Gronwall, 1977).

### **Executive attention**

In general, the relation between mindfulness meditation and executive attention appears to be highly uncertain. The Chiesa et al. (2011) review showed mixed results across trials; two of the five prospective trials included indicated significantly improved executive attention ability due to mindfulness practice (Tang et al., 2007; Wenk-Sormaz, 2005). For instance, Wenk-Sormaz (2005) found that mindfulness meditators performed better on the Stroop Task (Stroop, 1935) by a significant reduction in Stroop interference.<sup>4</sup> The remaining three studies did, however, not find any significant differences between mindfulness conditions and control groups on various executive attention tasks (Anderson et al., 2007; Jha et al., 2007; Polak, 2009). In the review's (Chiesa et al., 2011) so-called case-control studies where experienced meditators were compared with control groups on executive attention tasks, two studies (Chan & Woollacott, 2007; Moore & Malinowski, 2009) showed that meditators performed better than controls on the Stroop Task. Van den Hurk (2010) on the other hand, found no significant group differences between meditators and controls in executive attention, using the ANT. Chan and Woollacott (2007) also found that meditation frequency as measured by minutes of meditation/day was significantly positively correlated to better Stroop interference performance whilst total number of hours of meditation experience was not. A study not

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<sup>4</sup> Stroop interference is a term used for the performance cost in reaction time between two Stroop conditions: the incongruent condition and a control condition. Stroop facilitation is another term used to reflect the difference in reaction time between a congruent and a neutral condition. While the former has been shown to slow down the process, the latter sometimes speeds it up (MacLeod, 2005).

included in Chiesa et al. (2011) showed no significant differences on the Stroop Task between long-term mindfulness meditators and non-meditators (Lykins et al., 2010).

The majority of trials have used non-active control groups with a few exceptions. For instance, three studies compared the effect of an MBI versus relaxation training on executive attention tasks. The aforementioned study by Tang et al. (2007) showed that a one-week MBI, with only five 20-minute sessions, significantly improved executive attention performance on the ANT compared to relaxation training. On the other hand, Semple (2010) as well as Polak (2009), found no such differences, neither between mindfulness and relaxation, nor between mindfulness and control, on the Stroop Task.

Executive attention ability, as measured by the Stroop Task, was not at all related to self-reported mindfulness (the MAAS) in Schmertz (2006), whereas Moore and Malinowski (2009) found significant positive relations between KIMS scores (the Kentucky Inventory of Mindfulness Skills; Baer, Smith, & Allen, 2004) and Stroop scores.

In sum, previous research on sustained and executive attention performance and mindfulness has resulted in mixed results. It should be noted, though, that study designs, populations, and methodological quality as well as attention measures vary to a great extent among these trials, making it difficult to draw any firm conclusions. For example, attention instruments probably vary in sensitivity in determining the effects on attentional abilities due to meditation, resulting in mixed results. Valentine and Sweet (1999) as well as Hankey (2006) suggest that different types of meditation activate different regions of the brain and thereby generate diverse effects on attentional systems. Thus it is important to categorize meditation types in order to investigate how one specific meditation type affects sustained attention and executive attention, respectively. The stronger relation between meditation and attention-related brain activation shown in neuropsychological studies (e.g. Farb et al., 2007; Lazar et al., 2005) (as briefly mentioned earlier) compared to behavioural studies on

attentional performance might be related to meditation experience. Neuropsychological studies have often included expert meditators with very long meditation experience (e.g. Brefczynski-Lewis et al., 2007; Cahn & Polich, 2009; Carter et al., 2005), while several behavioural intervention studies have had meditation groups consisting of participants with no prior meditation experience at all (e.g. Jha et al., 2007; Wenk-Sormaz, 2005). Moreover, it is not yet clear for how long and how frequently one has to practise meditation before improvements in attention can be detected on attention tests. In this line of research it is important to control for the influence of age effects, because of age-related decline in performance on attention tasks (e.g. Dulaney & Rogers, 1994; Jha et al., 2007; Reuter-Lorenz & Stanczak, 2000; West, 1996). Since Western definitions and theories of mindfulness emphasize self-regulated attention as the essence of mindfulness (e.g. Bishop et al., 2004; Kabat-Zinn, 1994; Shapiro et al., 2006) it is surprising that only a few studies have investigated the relation between self-reported mindfulness and attention (e.g. Cheyne et al., 2006; Moore & Malinowski, 2009; Schmertz, 2006; Schmertz et al., 2009). Hence, the relation between mindfulness and attention regulation remains unclear and calls for further research. In the development of theoretical models and operationalizable definitions it is of major importance to establish the role attention plays in the mindfulness construct.

### **Mindfulness and coping**

Aside from the proposed mechanism re-perceiving and its additional mechanisms (Shapiro et al., 2006), it has also been suggested that the improved health effects of MBI, stress reduction, in particular, may be a question of the facilitation of more adaptive coping strategies (Weinstein, Brown, & Ryan, 2009). The theory of psychological stress and coping, originally introduced by Lazarus and colleagues (e.g. Lazarus & Folkman, 1984, Lazarus, 1991), includes two processes, *cognitive appraisal* and *coping*. Cognitive appraisal refers to the

individual's evaluations of events. *Primary appraisal* is the initial evaluation of whether a particular event is relevant or not for that person's well-being. Is this event a potential threat or not? Could this event prevent me from attaining my goals? *Secondary appraisal* is the evaluation of how to best respond to that situation. Coping is then the actual response to that event, and is generally defined as "the person's constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the person's resources" (Lazarus & Folkman, 1984, p.141). Three general types of coping have been identified: *problem-focused coping*, which is a problem-solving approach aimed at eliminating or altering the source of stress; *emotion-focused coping* aimed at reducing distressing emotions associated with a stressful encounter; and *avoidant coping*, a less adaptive coping style, associated with denial and disengagement (Carver, Scheier & Weintraub, 1989; Weinstein et al., 2009).

Weinstein et al. (2009) hypothesize that a mindful processing of internal current events may promote more adaptive coping strategies (i.e. actively trying to deal with the problem). This is consistent with the function of re-perceiving; instead of being mentally and emotionally caught up in the experience, one can, through the state of mindfulness, shift perspective and relate objectively to the event itself as well as to one's own cognitive and emotional reactions associated with experiencing the event, potentially leading to more adaptive health-related behaviours as well as improved cognitive flexibility (Shapiro et al., 2006).

To date, the relation between mindfulness and coping has gained very little empirical attention. A pilot study on the effects of MBSR on a high-stress working population revealed that positive coping strategies, but not negative coping strategies, were significantly increased at the post-test (Walach, Nord, Zier, Dietz-Waschkowski, Kersig, & Schupback, 2007). Furthermore, Weinstein et al. (2009) showed in a series of four studies on student samples that (i) less use of avoidant coping was predicted by trait mindfulness in response to a social

threat task; (ii) over a one-month period, trait mindfulness predicted more use of approach<sup>5</sup> coping and less use of avoidant coping; (iii) on a daily level, trait mindfulness was also associated with less avoidant coping and more approach coping; and (iiii) in a real-life stress situation over time, initial trait mindfulness predicted less use of avoidant coping. In contrast, Sears and Kraus (2009) found no significant pre- to post-test changes in approach coping and avoidant coping in a mindfulness meditation group compared to controls.

Hence, results so far point towards trait mindfulness being positively associated with approach coping and negatively associated with avoidant coping. However, Weinstein et al. (2009) used only the onedimensional Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) to assess trait mindfulness, and the authors recommend future studies to more closely explore how other facets of mindfulness (as measured by the five-dimensional FFMQ) relate to coping styles. Additionally, because of the mixed results concerning the effect of MBI on coping styles, further examination is required.

## **The empirical studies**

### **Aims**

There is still an unfortunate lack of consensus among researchers on how mindfulness is best understood and how it should be conceptualized and assessed. Thus, it has not yet been satisfactorily clarified exactly what mindfulness is, how it works, and to an even lesser extent, what its mechanisms are. For example, it has not been sufficiently studied whether it really is the mindfulness component in MBIs that causes the observed health effects. In consequence, basic research aiming at understanding the nature of mindfulness is undoubtedly very much needed. Hence, the general aim of the current research project was to contribute to previous

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<sup>5</sup> Approach coping in Weinstein et al. (2009) was assessed by combining the following three coping strategies, taken from the Cope Inventory (Carver et al., 1989): *Active coping* (Problem-focused coping), *Acceptance* and *Positive reinterpretation and growth* (Emotion-focused coping).



mindfulness research by exploring fundamental aspects of mindfulness in an effort to increase the understanding of mindfulness as a construct, as well as its mechanisms.

**Studies I and II.** The purpose of the first study was to investigate the relation between mindfulness and sustained and executive attention by comparing mindfulness meditators and non-meditators in performance on objective computerized attention tests designed to measure sustained and executive attention. The following hypotheses were tested: (a) meditators will perform better on a sustained attention test than non-meditators, although the potential differences are expected to be small; (b) meditators are also expected to perform better than non-meditators on an executive attention test compared to non-meditators; (c) length of meditation experience and current meditation frequency are expected to correlate positively with performance on sustained and executive attention; (d) high FFMQ scores are expected to be associated with fewer sustained attention errors as well as lower interference scores on executive attention.

The main purpose of the second study was to replicate Baer et al.'s (2008) study in order to investigate whether mindfulness facets mediate the relation between meditation experience and psychological well-being, using a different mediation analysis method, and by doing so, further extend the results from the Baer et al. (2008) study (see the methods section for further information). The majority of psychometric research on mindfulness assessment is conducted on North American populations. Study II also aims at exploring whether Baer et al.'s (2008) results can be generalized to a Swedish sample that included both meditators and non-meditators. The following predictions were made: (a) experienced meditators will score higher than non-meditators on all mindfulness facets, as well as on psychological well-being; (b) length of meditation experience will be positively related to all facets of mindfulness, and to psychological well-being; and (c) the relation between meditation experience and psychological well-being will be mediated by mindfulness.

**Study III.** Although mindfulness research has advanced significantly during the last decade, several crucial areas still demand further empirical examination. For instance, investigating the unique effects of MBIs, which has almost been neglected in previous research, ought to be highly prioritized. There is also a need to develop and evaluate short-term MBIs in clinical as well as in non-clinical populations. Furthermore, theoretically, attention is widely regarded as the core mindfulness component, but studies so far only partly support this notion. Finally, numerous studies provide evidence for the positive health effects gained by MBIs, but proposed mechanisms (i.e. re-perceiving/decentering and improved adaptive coping styles) responsible for these beneficial effects have rarely been explored. Therefore, the general aim of the third study was to contribute to the understanding of mindfulness and its potential mechanisms. By employing a randomized controlled trial, the effects of a short MBI was investigated on a battery of tests - executive attention, self-reported mindfulness, decentering, psychological well-being, anxiety, depression, and coping styles – in a working population. Mindfulness meditation was compared with both an active control group (relaxation training) as well as an inactive wait-list group. A secondary aim was to examine changes in mindfulness in relation to changes in decentering, psychological well-being, executive attention, anxiety, depression, and coping style. An additional aim was also to examine whether the proposed decentering mechanism mediates the assumed relation between self-reported mindfulness and psychological health (psychological well-being, anxiety, and depression). Based on theory and previous results it was hypothesized that (a) the mindfulness group would increase significantly in mindfulness and decentering from pre- to post-test compared to the other two groups; and (b) that both the mindfulness group and the relaxation group would show significantly greater improvements than the wait-list group in depression, anxiety and psychological well-being. In view of the previously described mixed results on attention and coping styles in relation to mindfulness, it was decided to study these

potential intervention effects in an exploratory fashion, without making any specific predictions. In the mindfulness group, it was hypothesized that (c) mindfulness changes would correlate positively with decentering change, and that both mindfulness changes as well as decentering change would be positively related to psychological well-being change. It was also expected that (d) mindfulness changes as well as decentering change in the mindfulness group were negatively related to anxiety and depression changes. Furthermore, it was also predicted that (d) decentering would act as a mediator between mindfulness and all three psychological health outcome variables, psychological well-being, anxiety, and depression.

## **Method**

### **Participants**

**Studies I and II.** The participants were 45 university students, 35 Buddhist meditators, and 12 individuals from non-religious meditating groups. The participants were divided into two distinct groups: non-meditators and experienced meditators. In addition, the participants were also divided into two other groups based on the participants' current frequency of meditation: high-frequent meditators and matched non-meditators, matched as closely in age and gender as the sample allowed.

**Study III.** Ninety-eight employees with no prior meditation experience were voluntarily recruited and randomized into two groups; a mindfulness meditation group and a relaxation training group. In addition, a new recruitment campaign was made a year and a half later from the same workplaces and organizations, resulting in 40 participants who subsequently constituted a wait-list group. In all, 126 individuals participated in the present study.

## **Material**

### **Primary measures: Studies I and II**

**The Sustained Attention to Response Test** is a computerized test designed to measure sustained attention. At the centre of the computer screen, a pre-fixed quasi-randomized series of digits (10 mm, Times New Roman) ranging from 1 to 9 is presented. In one single sequence every digit is presented 24 times; in all 216 digits run for approximately 4 minutes and 23 seconds. Every digit is presented for 250 msec, and then followed by a centred 900 msec mask (a ring with a cross). The task is to respond by pressing the enter key for every digit, before the next digit comes up on the screen, except for the digit “3” where participants are instructed to not respond. The targets (3) are presented 24 times and non-targets (all digits except 3) 192 times. Participants were given written instructions to respond as quickly and as accurately as possible.

SART errors is the total sum of errors for both targets and non-targets, including error responses for targets (responding to 3), error responses for non-targets (not responding to digits other than 3) and the number of responses, more than once, to non-targets (responding twice for digits other than 3). SART RT is the average reaction time for responses to non-targets.

**The Stroop Task** measures executive attentional functioning by demanding that participants ignore their habitual and automatized process of word reading, in favour of attending to and responding to a less typical task: the colour the word is printed in. The Stroop effect means that the response time for incongruent colour-words (e.g. the word red printed in blue) is slower and less accurate than for congruent colour-words (e.g. the word red printed in red) as well as for a neutral control condition (e.g. XXX printed in red). This incongruence effect is usually referred to as Stroop interference (MacLeod, 2005). Low interference scores could thus be interpreted as reflecting a high level of executive attention.

A computerized version of the Stroop Task (SuperLabpro, version 2.0.4) was used. In short, participants were presented written instructions to press the key in the same colour as three coloured Xs (XXX) shown at the centre of the screen. Four colours were used: green, yellow, blue, and red. Participants were instructed to respond as quickly and as accurately as possible. The test consisted of 30 quasi-randomized stimuli including ten XXXs, ten congruent colour-words, and ten incongruent colour-words.

Stroop interference (incongruent – neutral) was calculated by subtracting the average reaction time (RT) (msec) for the incongruent condition from the average RT for the neutral condition. Stroop interference (incongruent – congruent) was calculated by subtracting the average RT for the incongruent condition from the average RT for the congruent condition. Stroop errors are the errors made in the incongruent condition only. Stroop RT is the average reaction time for correct responses in the incongruent condition.

**The Five Facet Mindfulness Questionnaire.** To measure self-reported mindfulness, the Swedish version of the FFMQ was used (Lilja et al., 2009). The FFMQ is designed to measure five distinct mindfulness facets and consists of 39 statements using a 1 - 5 Likert scale (“Never or very rarely true” to “Very often or always true”). High scores indicate a high level of mindfulness. The facets are: Nonreactivity to inner experience (e.g. “I perceive my feelings and emotions without having to react to them”), Observing (e.g. “I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow”), Acting with awareness (“It seems I am ‘running on automatic’ without much awareness of what I am doing”, reversed), Describing (“It’s hard for me to find the words to describe what I’m thinking”, reversed), and Nonjudging of experience (“I believe some of my thoughts are abnormal or bad and I shouldn’t think that way”, reversed).

**Psychological Well-Being.** A Swedish version (Lindfors, 2002; Lindfors, Berntsson & Lundberg, 2006) of the short form of Ryff’s Psychological Well-Being scale (PWB; Ryff,

1989; Ryff & Keyes, 1995) was used in this study. This short version of PWB consists of 18 items with a 1 - 6 Likert scale (“completely disagree” to “completely agree”), where higher scores indicate higher levels of psychological well-being. The items cover six dimensions of psychological well-being (with three items each): Self-acceptance (e.g. “I like most aspects of my personality”), Positive relations with others (e.g. “Maintaining close relationships has been difficult and frustrating for me”, reversed), Autonomy (e.g. “I tend to be influenced by people with strong opinions”, reversed), Environmental mastery (e.g. “I am quite good at managing the responsibilities of my daily life”), Purpose in life (“I sometimes feel as if I’ve done all there is to do in life”, reversed), Personal growth (“For me, life has been a continuous process of learning, and growth”). The present study used only the total PWB scale.

### **Study III**

**The Stroop Task.** The Stroop Task used in this study was identical to the test that was used in the previous studies, with one exception: this test was extended and consisted of 82 quasi-randomized stimuli including ten XXXs, 36 congruent colour-words, and 36 incongruent colour-words.

**The Five Facet Mindfulness Questionnaire (FFMQ).**

**Psychological Well-Being (PWB).**

**The COPE inventory.** The instrument measures 14 different coping strategies on a 1 - 4 scale (“I did not do this at all” to “I did this a lot”) and consists of 13 scales and one single item question. Five scales assess Problem-focused coping (Active coping, Planning, Suppression of competing activities, Restraint coping, and Seeking social support for instrumental reasons). Five other scales measure Emotion-focused coping (Seeking social support for emotional reasons, Positive reinterpretation & growth, Acceptance, Turning to religion, Focus on & venting of emotions). The remaining three scales and the single item

question measure Avoidant coping, reflecting less adaptive coping strategies (Denial, Behavioral disengagement, Mental disengagement, Alcohol-drug disengagement).

**The Hospital Anxiety and Depression Scale (HAD).** The measure consists of two subscales: Anxiety (HAD-A) and Depression (HAD-D). The subscales contain seven items each on a 0 - 3 scale. A total sum score is calculated for anxiety and depression respectively, ranging from 0-21. Each subscale has three cut-off points: Anxiety: 0 - 6 = no anxiety problems, 7 - 10 = mild to moderate anxiety, and >10 = potential anxiety disorder. Depression: 0 - 6 = no depression, 7 - 10 = depressed mood/gloominess, and >10 = potential risk for depression that may require professional treatment.

**The Experience Questionnaire (EQ).** The Decentering subscale of the EQ (Fresco et al., 2007) was used to assess decentering. The scale consists of 12 items on a 5 - point Likert scale (never to always). Higher scores indicate higher levels of decentering (e.g. "I can separate myself from my thoughts and feelings").

## **Procedure**

**Studies I and II.** Data collections for the Buddhists was conducted at each Buddhist centre, respectively. The two non-religious meditation groups and the seven student groups were given the attention tests and the FFMQ at the behavioural and cognitive laboratory at Halmstad University. All participants were given written and oral information about the study and were informed that the data was confidential, as well as their right to quit the study at any time. Participants did not receive any compensation for taking part in the study.

**Study III.** E-mails were sent to the personnel manager of several companies in Halmstad, asking if they had a preliminary interest in letting their staff participate in the present study. Thereafter, an information letter introducing the study was sent to the personnel manager of each respective organization, who then forwarded the information letter to the staff. In

addition, an advertisement about the study was also placed on the Halland Region website. The information letter presented the purpose of the study, the inclusion criteria (e.g. no prior meditation experience), and a careful description of the content and procedure of the data collections. Employees interested in participating in the present study were encouraged to contact one of the authors by e-mail or phone. All individuals who expressed interest in participating were invited to a brief presentation of the study, held at Halmstad University. At the presentation, written informed consent forms were collected. The second recruitment was made one and a half years after the first one. The same companies were approached, and the procedure was similar to the first recruitment, but there was no invitation to the University for a presentation of the study. Instead, all information was sent by e-mail to the volunteers. Informed consent was completed prior to the first data collection.

The Stroop Task was administered at the behavioural and cognitive laboratory at Halmstad University. Instructions for the Stroop Task were given orally as well as in writing (on the computer screen). The self-report scales were administered on the same occasion. The pre-tests were administered prior to the first intervention session, and similarly, the post-tests were administered right before the last (the eighth) intervention session. Thus, the post-test was administered approximately four weeks after the pre-test.

All participants were given written and oral information about the study and were informed that the data was confidential. They were also told of their right to quit the study at any time. Participants did not receive any compensation for taking part in the study.

**Mindfulness meditation condition.** The MBI in the present study was not a manualized programme, and it is therefore not comparable to standardized MBIs such as MBSR (see Kabat-Zinn, 2004) and MBCT (see Segal et al., 2002). This MBI consisted mainly of standard sitting mindfulness practices; attention to the breath, awareness of and attention to internal objects (e.g. thoughts, images, emotions), bodily sensations (e.g. bodyscan exercises where



attention is paid to each body part), sensory perceptions (e.g. taste, smell), and external objects (e.g. sounds, sights). The subjects were taught to notice all these inner and outer objects with a so-called non-judgemental awareness and a general attitude of acceptance, thus not deliberately trying to affect or change whatever it is that arises in the field of consciousness. The major difference in content between this MBI and the MBSR programme is that the MBI used in this study did not include any yoga exercises.

**Relaxation training condition.** The relaxation programme aims at increasing body awareness and includes relaxation of major muscle groups and body parts, one by one, finally encompassing the whole body.

The duration of each interventions was four weeks, consisting of two 45 minute-sessions/week. Since the eighth and last session took place after the data collection, the total number of intervention sessions between the pre- and post-test was seven.

## **Statistical analyses**

**Study I.** ANCOVAs controlling for age were conducted to study differences between high-frequency meditators and matched non-meditators on SART and the Stroop Task. Partial correlations analysing the total sample, controlling for age, were used to investigate relations between meditation experience and current meditation frequency with regard to SART and the Stroop Task. Hierarchical regression analyses in the total sample, controlling for age, were performed to study relations between FFMQ and SART as well as between FFMQ and the Stroop Task.

**Study II.** Independent t-tests were conducted to study differences between experienced meditators and non-meditators on the FFMQ -scales. The experienced meditators were significantly older than the non-meditators. Moreover, gender was shown to be significantly associated with some FFMQ -scales. ANCOVAs controlling for age and gender, were

therefore additionally conducted to explore differences between these groups on the FFMQ-scales. ANCOVA, controlling for age, was used to study differences between the experienced meditators and the non-meditators on the PWB total scale.

Partial correlations (on the whole sample), controlling for age and gender, were used to study the intercorrelations between the FFMQ -scales as well as the relation between meditation experience and FFMQ -scales. Partial correlations (on the whole sample), controlling for age, were used to examine the relation between meditation experience and PWB total scale.

Simple and multiple mediation (Preacher & Hayes, 2008) was tested in a path-model framework by estimating direct, total indirect, specific indirect and total effects using Mplus version 5 (Muthén & Muthén, 1998 - 2007) employing the ML estimator. This approach to testing mediation focuses on estimating direct, indirect and total effects that are calculated using the regression coefficients obtained when all aspects of the model are simultaneously included in the equations. The direct effect is the influence a variable has on another variable in a direct linkage, the (total) indirect effect consists of all paths from one variable to another variable that are mediated by one or more additional variables, the specific indirect effect is the decomposition of the total indirect effect into specific indirect paths, and the total effect is the sum of the direct and total indirect effects (Brown, 1997).

In accordance with recommendations by Preacher and Hayes (2008), the standard errors for these effects were estimated using Bootstrap. Because the use of Bootstrap is not possible with missing data, participants with incomplete data on the variables in the path models were excluded from the analyses (5 participants in total). Age and gender were controlled for in all mediation analyses.

**Study III.** One-way ANCOVAs, controlling for the pre-test and education, were conducted to explore post-test differences between the three conditions on the Stroop

variables, the FFMQ -scales, decentering, the PWB total scale, the HAD scales, and the Cope scales (Problem-focused coping, Emotion-focused coping, and Avoidant coping). Pearson's  $r$  was used to examine pre- and post-test relations between FFMQ scales and Decentering. Change score variables were computed for all above mentioned scales. Pearson's  $r$  was used to study relations in changes from pre- and post test (in the total sample as well as separate analyses for the three conditions) between FFMQ change scales and decentering change, as well as these scales' relations with Coping style changes, HAD changes, PWB total change scale, and Stroop changes.

Mediation analyses were performed in accordance with the recommendations in Preacher and Hayes (2004). The SPSS macro script (Preacher & Hayes, 2008) was used for all analyses. A bootstrapping procedure was used to test indirect effects (bootstrapped sample 5000). Since the ANCOVAs showed no significant post-test group differences on anxiety and depression, it was only tested if decentering mediated the relation between mindfulness (FFMQ total) (IV) and psychological well-being (PWB) (DV). Furthermore, results from the correlational analyses showed that decentering and the theoretically similar mindfulness facet Non-Reactive were strongly related to one another, indicating a substantial overlapping between the constructs. Therefore, a total FFMQ variable was computed where Non-Reactive was excluded. Thus, the FFMQ total scale used in the mediation analyses consisted of the remaining four facets: Describing, Non-Judging, Observing, and Acting with awareness. Cronbach's alpha for the revised FFMQ total scale was .86. Four simple mediation analyses were performed for each dependent variable, respectively. First, a cross-sectional model was tested on the total sample including pre-test scores on mindfulness (IV), decentering (M), and PWB (DV). The following three models were tested using a sample consisting of the two active intervention groups (mindfulness and relaxation). The second model consisted of pre-test mindfulness, post-test decentering, and post-test PWB. The third model included pre-test

mindfulness, decentering pre-post change, and post-test PWB. The fourth model included only pre - post change scores: mindfulness change, decentering change, and PWB change.

## **Results and discussion**

### **Study I**

The results showed no significant differences between experienced meditators and non-meditators on SART or the Stroop Task (see Table 1). Similarly, no significant differences were found between high-frequent meditators and matched non-meditators on any SART- or Stroop-variables. Also similarly, correlational analyses showed that neither meditation experience nor current meditation frequency was significantly correlated to either SART or Stroop. Regression analyses revealed few significant relations between FFMQ and SART or between FFMQ and Stroop: the total FFMQ scale and Describing were significant predictors of SART errors. High scores on the FFMQ total scale and Describing are related to fewer SART errors. Describing was also a significant predictor of Stroop interference (incongruent – congruent) indicating that high scores on Describing are related to low Stroop interference scores.

Insert Table 1

Insert Table 2

One way to interpret the findings of study I is that mindfulness meditation does not have a great impact on attention regulation. A possible hypothesis could be that attention tasks requiring quick responses to external targets may be inappropriate when assessing attention abilities in mindfulness meditating populations where attention exercises are mainly directed

to internal processes and sensations. Thus, internally directed attention may be cultivated and improved as a result of mindfulness meditation because that is what is actually practised in mindfulness-related meditation (open monitoring meditation), whereas attention directed towards external targets may be less affected by this type of meditation. The poor relation between self-reported mindfulness and Stroop variables may be a further implication of the potential discrepancies between mindfulness-related attention abilities and attention assessment methods. A challenge in future mindfulness research will therefore be to find alternative attention measures suitable especially for meditators. Controlling for prior computer game experience is also recommended if computerized attention tasks are used, since such experience could potentially bias the results.

## **Study II**

Experienced meditators rated themselves higher than non-meditators on four of the five FFMQ subscales: Non-Reactive, Observing, Acting with awareness, and Non-Judging, and a similar trend was also found for Describing (see Table 2). However, after controlling for age and gender, ANCOVAs showed that the experienced meditators scored higher only on two mindfulness facets: Non-Reactive and Observing. All facets of mindfulness were intercorrelated with the exception of Non-Reactive and Describing. Correlational analyses further showed that three mindfulness facets (Acting with awareness, Non-Judging, Observing) as well as the total FFMQ scale were significantly related to meditation experience. Simple mediation analyses showed direct effects of meditation experience only on Non-Reactive and Observing. Direct effects of mindfulness facets on PWB were found for Non-Reactive, Acting with awareness, Describing, and Non-Judging. Non-Reactive was the only mindfulness facet that significantly mediated the relation between meditation experience and PWB (see Table 3). Multiple mediation analysis, controlling for age and gender, showed a significant total indirect effect of meditation experience on psychological well-being via the

five mindfulness facets. In this model, the direct effect of meditation experience on well-being was not significant, indicating that this relationship was mediated by the mindfulness facets. However, when this multiple mediation model simultaneously contained all of the FFMQ facets, none of the specific indirect effects for each mindfulness facet was significant (see Table 4).

Insert Table 3

Insert Table 4

The findings in this study showed that Non-Reactive and Observing are the facets that are most strongly associated with mindfulness and meditation experience, suggesting that the qualities associated with these two particular facets may be the ones that are most cultivated by mindfulness meditation. This is not entirely unexpected, since Non-Reactive and Observing contain elements that are specifically practised extensively in mindfulness meditation. Furthermore, the simple mediation analyses showed that Non-Reactive was the only facet that significantly mediated the relationship between meditation experience and psychological well-being. Thus, the ability to not react to stressful inner experiences and simply let them pass by seems to be a crucial element in mindfulness. Additionally, this particular facet also seems to comprise qualities that are beneficial for psychological well-being. The results of the multiple mediation analysis are consistent with the idea that meditation experience is associated with increased mindfulness skills in daily life, and that these skills in turn tend to be positively related to psychological well-being. In contrast to Baer et al. (2008) the present results showed no association between Describing and meditation experience, suggesting that the ability to verbally describe feelings and thoughts is

not enhanced and cultivated by mindfulness meditation practice. Moreover, it is important to emphasize that “describing-skills” are not formally practised in Buddhist meditation for mindfulness. The main task in the majority of mindfulness meditation practices, at least in Buddhist traditions, is to notice and attend to whatever arises in the mind, not to verbally express and explain those thoughts and feelings. The results concerning the relationship between meditation experience and Describing may perhaps reflect this discrepancy between Buddhist theory and other methods. Further research on the Describing facet and its relation to the mindfulness construct is warranted.

### **Study III**

ANCOVAs showed significant effects on two FFMQ scales: Describing and the FFMQ total scale. The mindfulness group as well as the relaxation group rated themselves significantly higher than the wait-list group on Describing. Furthermore, the mindfulness group scored significantly higher than the wait-list group on the FFMQ total scale. A significant effect was also found on the PWB total scale: the mindfulness group scored higher than the wait-list group. No significant group differences were found on any coping style scales, Stroop variables, HAD scales, or decentering (see Table 5). Thus, the results indicate that a short-term MBI improves mindfulness and psychological well-being in a non-clinical working population compared to a wait-list group.

Insert Table 5

Analysing the total sample, at the pre-test, decentering was positively correlated with the FFMQ total scale ( $r[104] = 0.72, p < 0.001$ ) as well as all mindfulness facets, ranging from

$r = 0.35$  (Observing) to  $r = 0.72$  (Non-Reactive). Similarly, at the post-test, decentering was positively correlated with the FFMQ total scale ( $r[104] = 0.81, p < 0.001$ ) and all mindfulness facets, ranging from  $r = 0.44$  (Non-Judging) to  $r = 0.72$  (Non-Reactive). Furthermore, in the mindfulness group decentering change showed significant positive relations with two FFMQ change variables: Non-Reactive ( $r[38] = 0.53, p < 0.01$ ), Observing change ( $r[38] = 0.32, p = 0.05$ ), and FFMQ total scale ( $r[38] = 0.50, p < 0.01$ ). Further, decentering change was also positively related to PWB change ( $r[38] = 0.42, p < 0.01$ ).

The overall results from the simple mediation analyses showed that decentering, in three (of the four) models that were tested significantly mediated the relationship between mindfulness and PWB. Moreover, all direct effects of mindfulness on decentering were significant and positive, except in one model (PWB 3) where the effect was non-significant. The direct effect of mindfulness on PWB was significant and positive in all four models. The total effect of mindfulness (when decentering was controlled for) was significant and positive in three models (PWB 1, PWB 3, and PWB 4), and non-significant in PWB 2. The total effect of decentering on PWB (when mindfulness was controlled for) was significant and positive in two models (PWB 1, PWB 2), and non-significant in the remaining two models. The bootstrap analyses revealed that decentering significantly mediated the effect of mindfulness on PWB in three models (PWB 1, PWB 2, and PWB 4) (see Table 6).

Insert Table 6

In short, the study failed to distinguish any unique mindfulness effects, since there were no differences between mindfulness and relaxation in any of the variables. The length of the intervention may have been too short and the sessions too few, and the similarities between body exercises in MBI and relaxation, and the absence of group differences on decentering



may partly explain the lack of unique MBI effects. Mediation analyses supported the hypothesis that increases in mindfulness lead to increased decentering abilities, which in turn leads to improved PWB. However, it is highly possible that other mechanisms, aside from decentering, contribute to increased well-being (see Grabovac et al., 2011). Moreover, since the mindfulness group scored higher than the wait-list group on FFMQ total scale and PWB, it may be suggested that self-reported mindfulness and psychological well-being are developed more quickly and before symptom reductions in anxiety and depression take place.

The results of the present study clearly give further support to previous studies (Lykins et al., 2010) that indicate that executive attention is not improved by mindfulness training. It may be concluded that effects on attention regulation may be of less importance compared to other beneficial psychological and physiological health outcomes due to mindfulness meditation (Lykins et al., 2010). Considering that the concentration-based exercises in MBIs could be regarded as training in sustained attention, it may not be surprising that executive functioning is usually not improved due to mindfulness practice. However, it is possible that the attention instruments are not sensitive enough to detect potential MBI effects on attention, such as the refined and improved capacity to attend to internal stimuli (thoughts and emotions). Since no group effects were found on coping style, it may be concluded that short-term mindfulness training does not increase problem-focused coping and decrease avoidant coping in an average working population.

### **General discussion**

The general aim of the present thesis was to contribute to previous mindfulness research by exploring fundamental aspects as suggested in theories, ideas, and conceptualizations of

mindfulness, in an effort to increase the understanding of mindfulness as a construct as well as its mechanisms.

### **Mindfulness and attention**

The results of studies I and III suggest that mindfulness meditation as practised in Western MBIs as well as in Swedish Buddhist meditating groups do not seem to improve performance on computerized attention tasks, and further, that the importance of the assumed attention component has been overemphasized in current theories of the mindfulness construct (the two-component model in Bishop et al., 2004, and the IAA model in Shapiro et al., 2006). Considering that (i) study III may have been underpowered (see Methodological issues), (ii) attention regulation obviously is practiced in mindfulness meditation (to a lesser extent, though, than in FA meditation), and (iii) a vast number of neurological studies indicate greater activity in attention-related parts of the brain (e.g. Brefczynski et al., 2007; Cahn & Polich, 2008), the hypothesis that mindfulness meditation improves attention regulation cannot be ruled out yet. A possible explanation is that improved attention regulation may require intensive long-term meditation practice, far beyond the amount of what is generally practised in an eight-week MBI. In comparison, MBSR consists of 32 class hours and an additional 45 minutes of daily home practice, while the expert meditators in, for instance, Brefczynski et al. (2007) had a meditation experience of 19 .000 to 44 .000 hours. Another example is Slagter et al. (2007), who found that meditators showed superior performance on an attention task compared to non-meditators. The meditators, however, performed the test right after a three-month intensive Vipassana retreat, consisting of approximately 900 to 1080 hours of meditation practice. Thus, it is plausible that the effect of a regular MBI, consisting of participants with no previous meditation experience, on attention regulation is at best only of a small magnitude, if there is one at all, whereas intensive long-term practice may eventually

lead to improved performance on attention tests. This hypothesis could explain why changes in brain structure and superior activation in parts of the brain associated with attention have been found in Buddhist expert meditators (e.g. Carter et al., 2005; Brefczynski et al., 2007; Lazar et al., 2005; Pagnoni & Cekic, 2007), whilst study III as well as several other studies (e.g. Anderson et al., 2007) investigating performance on attention tasks after an MBI have failed to distinguish any significant differences between the meditation group and the control group. However, since it has been strongly emphasized that mindfulness as a construct should be separated from mindfulness as a practice (e.g. Brown et al., 2007), self-regulated attention should not necessarily be included as a component in the mindfulness construct; attention regulation appears to be more related to meditation practice, while the essence of the mindfulness construct may be better captured in terms of “pure consciousness” or “awareness behaviour”. As suggested by some researchers (e.g. Kang & Whittingham, 2010; Mikulas, 2010), *awareness* may be a term that is better suited than *attention* as the core component in the mindfulness concept. Hence, in future mindfulness theories, less emphasis ought to be paid on attention regulation as a component.

### **Mindfulness, decentering and psychological well-being**

The results of studies II and III mainly indicate that psychological well-being, as expected, is associated both with mindfulness meditation and self-reported mindfulness. Moreover, it appears that mindfulness meditation rather quickly improves psychological well-being in non-clinical populations, and that this improvement is associated with a “decentering capacity”, thus giving support to Shapiro et al.’s (2006) theory of decentering as an important mechanism in the relationship between mindfulness and psychological well-being. Although a rather strong support was found for the mediating effect of decentering, it is highly possible that other mechanisms, aside from decentering, contribute to increased well-being. In the

BPM (Grabovac et al., 2011), several components are believed to lead to the proposed mechanism, decreased mental proliferation, and decentering is associated with only two of those components (as described earlier in this paper). Thus, decentering contributes significantly to decreased mental proliferation, but decentering is not viewed as the major sole mechanism in the BPM. Other aspects, such as insights about the three characteristics, may play an even more important role than decentering in the enhancement of decreased mental proliferation, which is hypothesized to lead to improved mental health and well-being. Nonetheless, decentering does at least seem to be a crucial secondary mechanism.

The difference between the mediation results from study III compared to Carmody et al. (2009), who did not find any support for decentering as a mediator between mindfulness and psychological health outcomes, may be influenced by the fact that Non-Reactive was excluded from the mindfulness variable (and the other four facets were kept) in the current analysis while Carmody and colleagues (2009) composed their mindfulness variable by the three FFMQ facets; Non-Reactive, Observing and Non-Judging. The strong correlations that were found in study III at the pre- and the post-tests between decentering and Non-Reactive (in the total sample) as well as the strong correlation between decentering change and Non-Reactive change in the mindfulness group may reflect the theoretical similarities between these two constructs, and it is highly possible that they, to a substantial extent, assess the same phenomena. Furthermore, the pre- and post-test correlations between the FFMQ total scale and decentering in the overall sample are similar to what Carmody et al. (2009) found, and confirm their conclusion that mindfulness (as measured by the FFMQ) and decentering (as measured by the EQ) should be seen as overlapping rather than separate constructs, and therefore probably reflect an underlying measurement problem. Thus, the question remains whether decentering is a separate construct as suggested by Shapiro et al. (2006); should decentering be seen as an effect of mindfulness, or is it rather a part of an overall mindfulness

construct? In order to properly examine decentering as a mechanism enhanced by mindfulness practice, it is necessary to use measures that clearly separate mindfulness from decentering.

### **Methodological issues**

A conclusion drawn from study I is that sustained and executive attention performances on tests probably are affected by many factors other than mindfulness meditation experience. Computer usage and computer game experience are variables that should have been controlled for. It is therefore recommended that these variables be controlled for in future studies of relations between mindfulness and performance on computerized attention tasks. A major limitation of studies I and II is the absence of carefully matched non-meditators with regard to age. Although it has been controlled for statistically, it would be preferable to have age-matched meditators and non-meditators. It is also important to acknowledge the limitations of the cross-sectional design used in these studies. For example, the mediation results in study II are compatible with alternative explanations, like psychological well-being facilitating higher degrees of mindfulness, as well as increasing the motivation and capacity to continue the practice of meditation for a longer period of time.

With regard to study III, the generalizability to the average working population may be limited for several reasons. First, the participants who expressed interest in taking part in the study were probably specifically attracted to meditation and mindfulness. Second, the pre-test anxiety mean scores were higher than expected; almost a third of the participants' pre-test anxiety scores indicated a potential anxiety disorder, a result that may suggest that people with anxiety symptoms are more motivated to seek and take part in complementary and alternative treatments, such as mindfulness meditation and relaxation training, for their problems. Finally, the majority of participants had prior experiences in other meditation-related Eastern practices, such as yoga, Qi-gong, and tai-chi.

Study III had relatively few participants in each group, and the lack of significant post-test differences may to some extent be a question of low statistical power. To be able to detect an estimated small effect size ( $d = .20$ ) with an alpha of 0.5 and 81% power requires as many as 400 participants in each group (Cohen, 1988; ref: Kazdin, 2010). It is, to say the least, a challenging task to conduct a three-arm intervention study with such a large number of participants. Moreover, the modified short-term MBI used in study III has not been previously tested. This MBI is similar to the content in MBSR, but, as mentioned earlier in the method section, no yoga exercises were included in this programme. Carmody and Baer (2008) found that the yoga exercises in MBSR were significantly related to more outcome variables that indicate reductions in psychological symptoms than any other technique practised in the programme. Moreover, yoga was also significantly associated with four FFMQ facets as well as improved well-being (Carmody et al., 2008). In comparison, sitting meditation was only significantly related to increased well-being, two FFMQ facets, and two indicators of symptom reduction (Carmody et al., 2008). Thus, yoga appears to be a very important feature in MBSR. Maybe this is not so surprising, considering that previous research indicates that yoga reduces depression (Pilkington, Kirkwood, Rampes & Richardson, 2005; Uebelacker et al., 2010) as well as anxiety symptoms (Jahvnbakht, Hejazi Kenari & Ghazemi, 2009). Hence, the lack of significant anxiety and depression reductions may partially be influenced by the absence of yoga in the MBI used in the present study.

As described earlier in this paper; the increasing number of self-report questionnaires designed to assess mindfulness have been vastly criticized for suffering from several problems (e.g. interpretation and understanding of items may depend on meditation experience, substantial differences in content and a large variety in number of subscales among different measures) (Grossmann, 2008; Grossmann & Van Dam, 2011). In general, Grossmann and Van Dam (2011) thought that mindfulness has lost some of its original

Buddhist meaning in Western conceptualizations and definitions. In fact, Grossmann and Van Dam (2011) argued that the Western mindfulness concept might be at risk of being oversimplified and even banalized. Consequently, the majority of self-report questionnaires may not sufficiently reflect the Buddhist mindfulness construct. For instance, Describing and Acting with awareness (FFMQ) appear, according to Grossmann & Van Dam (2011), to have very little to do with mindfulness as it is described in Buddhist literature. Moreover, the majority of items in the Describing facet comes from the describing component in the KIMS (Baer et al., 2004), a measure that has conceptualized mindfulness as it is interpreted and practised in Dialectical Behavioral Therapy (Linehan, 1993) (which is a therapy specifically developed for treating borderline patients). Baer et al. (2004) also state that the skills measured in KIMS are “most similar to mindfulness as it is taught in DBT” (p. 193). In other words, the inclusion of Describing in Baer et al.’s (2006, 2008) mindfulness concept appears to be more influenced by certain DBT exercises than relevant Buddhist and mindfulness theories. Considering that Describing is neither theoretically related to the mindfulness construct nor practised in mindfulness meditation (except in the context of DBT), it is highly unlikely that this facet is an integral part of mindfulness. In sum, the validity of the FFMQ (as well as other mindfulness scales) may not be as strong as previous validation studies (e.g. Baer et al., 2008) have indicated. Thus, it is far from clear to what extent the FFMQ actually assesses the fundamental original characteristics of mindfulness. However, several alternative assessment strategies have been suggested (Grossman, 2011; Grossman & Van Dam, 2011). For instance, self-report measures could be developed that do not assess mindfulness per se but the extent to which respondents value different mindfulness-related behaviours, characteristics and views, as they are taught in meditation practices, such as contemplative stillness, sitting still, noticing sensations moment by moment, kindness to self and others, and so forth. Moreover, qualitative analyses may increase the understanding of mindfulness and

could provide important, and perhaps not yet acknowledged, information about potential mechanisms, characteristics, changes in self and value systems, and MBI related psychological effects (Grossman, 2008, 2011; Grossman & Van Dam, 2011). Hence, alternative promising “solutions” to the problems with existing mindfulness questionnaires have been suggested. Approaches such as the ones described above should play a significant role in future psychometric research on mindfulness.

Assessing a complex construct such as mindfulness is certainly a challenge for researchers, and it should definitely not be underestimated how important it is to develop reliable and valid measures in order to advance mindfulness research. Still, as Baer et al. (2006), among others, have stated, self-report scales nevertheless provide “new opportunities for empirical investigations of the nature of mindfulness and its relationships with other psychological constructs” (p. 28). In addition, mindfulness research is still in its infancy, and the process of developing mindfulness questionnaires and empirically investigating them may bring us closer to an understanding of the true essence of the mindfulness construct and thereby facilitate the definition and operationalization of mindfulness (Baer et al., 2006). However, it would be a severe mistake to quickly jump to a conclusion about what mindfulness is and how it should be operationalized (Grossman, 2008). Whether mindfulness researchers choose to use “alternative” assessment approaches or existing mindfulness questionnaires, Grossman (2008) and Grossman and Van Dam (2011) stressed that the researchers themselves should not forget to apply mindfulness related qualities such as present centred awareness, patience, openness, acceptance, and curiosity when conducting research on mindfulness.

### **Future research**

In sum, the studies in the current research project mainly suggest that mindfulness, as a construct as well as a practice, is related to increased psychological well-being. Improved



attention capacity does not seem to be closely related to either self-reported mindfulness or mindfulness meditation as practised in MBIs. Consistent with Shapiro et al.'s (2006) theory, the results from the mediation analyses in study III suggest that decentering may be an important mechanism in the relationship between mindfulness and psychological well-being. Moreover, mindfulness effects could not be distinguished from relaxation effects on any variables, suggesting that these two practices may include some overlapping elements. It is therefore necessary to further investigate the potential unique effects of mindfulness practice. Future trials should try an MBI longer than four weeks and compare the health effects with relaxation training, in clinical as well as in non-clinical populations. As Chiesa (2012) proposed, mindfulness meditators could be compared with relaxation practitioners on a number of variables, that is, cognition, body awareness, emotional regulation, and changes in self-perceptions. Furthermore, there is a need to study long-term effects due to MBIs (Chiesa, 2012). Thus, follow-up studies on, for instance, MBSR are highly warranted.

The BPM theory is very appealing and promising, and an important challenge for future research is to operationalize the mechanisms and empirically test this model. Ethical aspects, integrated into BPM and highlighted in recently introduced definitions (e.g. Kang & Whittingham, 2010), are a yet unexplored element of mindfulness that may increase our knowledge, not only of the mindfulness concept per se but also whether mindfulness practice is associated with changes in ethical values. Grossman and Van Dam (2011) hypothesized that MBI-related changes in value systems may play a more important role for improved psychological health than previously recognized. As stated earlier, measuring changes in self-perceptions and value systems may reveal new information about MBI mechanisms and effects.

The understanding of mindfulness may increase, if other integral Buddhist practices such as “the Four Immeasurables” (compassion, loving-kindness, equanimity, and sympathetic joy)

also are investigated (Grossman & Van Dam, 2011). For instance, further research should examine the effects of loving-kindness meditation (LKM), the wish for happiness and well-being in others and oneself, and compassion meditation (CM), the wish for relief of suffering in others and oneself. So far, effects of LKM and CM have only been examined in a few empirical studies. Preliminary results indicate that LKM increases positive emotions in daily life experiences (Fredrickson, Cohn, Coffey, Pek & Fink, 2008); reduces psychological distress, pain and anger in patients with chronic back pain (Carson et al., 2005); and increases social connectedness and positivity towards strangers (Hutcherson, Seppala & Gross, 2008). Furthermore, in a brain imaging study (using fMRI), CM was linked with activation in brain areas associated with empathy. Considering that LKM and CM are assumed to enhance compassion and empathy, Hofman, Grossman and Hinton (2011) hypothesized that these types of meditations could be useful tools for treatments of depression, and relationship problems as well as interpersonal problems. In addition, LKM and CM may also be used as a preventive strategy for professional caregivers or others whose work includes demanding relationships with clients, patients, pupils, and so on (Hofman, Grossman & Hinton, 2011). Hence, future studies are needed to examine the efficacy of LKM and CM on psychological well-being and also as an alternative or complementary treatment for depression, anxiety, mood symptoms, stress-related symptoms, and relationship problems.

Finally, the difficulties in defining, operationalizing and assessing mindfulness have caused a great deal of confusion about what mindfulness is and what it is not. Mindfulness as a concept has been repeatedly mixed up with methods and techniques used in mindfulness meditation practice as well as the observed effects of this practice. As a result, definitions and operationalizations have not yet been entirely successful. In accordance with what other researchers have stated (e.g. Chiesa, 2012), an in-depth dialogue between Western

researchers, expert meditators, and Buddhist theoreticians will be increasingly important for mindfulness research to advance.

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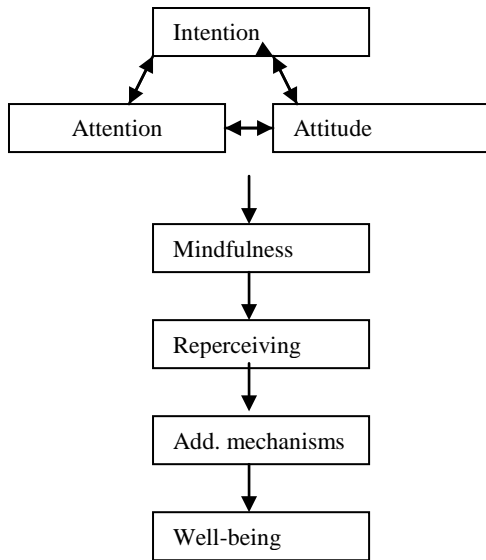


Figure 1. The IAA theory of mindfulness mechanisms.

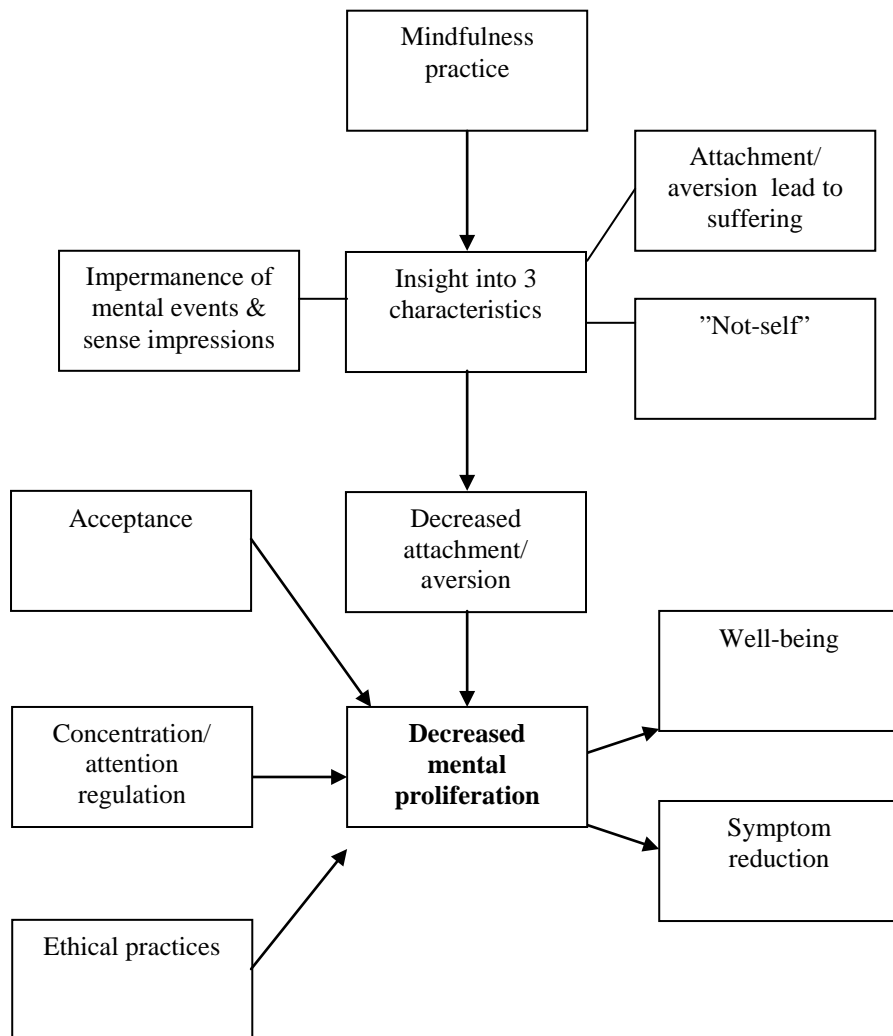


Figure 2. The Buddhist Psychological Model (BPM).

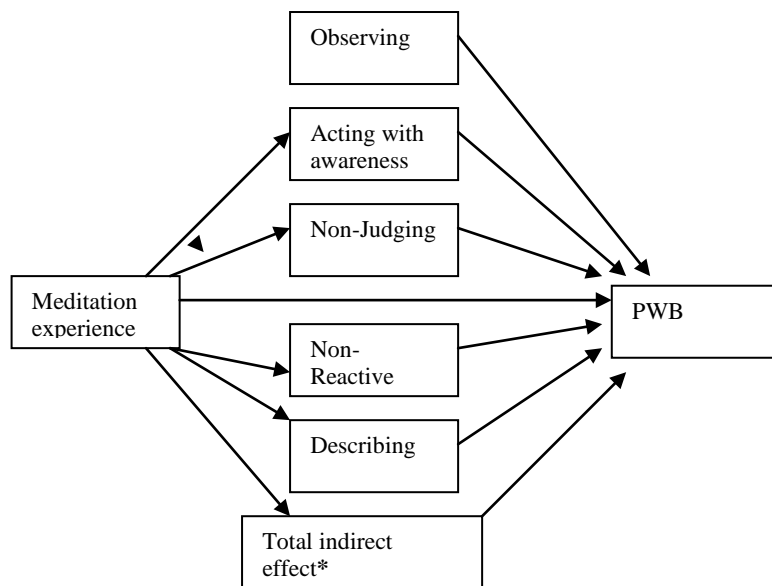


Figure 3. All mindfulness facets simultaneously tested in one model in this multiple mediation analysis. Age and gender were controlled for in the analysis. (\*  $p < 0.05$ ).

Table 1. Experienced meditators and non-meditators on SART- and Stroop variables.

	Exp. Meditators	Non-Meditators				
	M (SD)	M (SD)	$F(1,60)$	$p$	$\eta^2$	Obs. Power
SART RT	320.9 (72.9)	317.8 (66.6)	1.14	0.29	0.02	0.183
SART errors	20.2 (11.6)	17.9 (7.7)	0.11	0.74	0.002	0.062
Stroop interf. (I-N)	187.1 (245.8)	170.5 (184)	0.32	0.57	0.005	0.086
Stroop interf. (I-C)	183.7 (224.9)	182.9 (178.0)	0.78	0.38	0.01	0.140
Stroop facilit. (C-N)	-2.6 (134.8)	0.28 (106.9)	0.13	0.72	0.002	0.065
Stroop errors (N)	0.05 (0.23)	0.28 (0.54)	2.85	0.10	0.05	0.382
Stroop errors (C)	0.16 (0.98)	0.52 (2.0)	0.04	0.84	0.001	0.055
Stroop errors (I)	1.9 (3.4)	1.2 (2.5)	0.78	0.38	0.01	0.140
Stroop RT (N)*	914.5 (262.4)	819.4 (192.4)	0.001	0.97	0.000	0.050
Stroop RT (C)	919.6 (288.7)	821.3 (203.4)	0.05	0.83	0.001	0.055
Stroop RT (I)	1103.3 (359.0)	1005.9 (309.3)	0.16	0.69	0.003	0.068

Note. For SART RT (reaction time), Stroop RT (reaction time), Stroop Interference and Stroop Facilitation; means and SD:s are in msec. N = neutral condition, C = Congruent condition, I = Incongruent condition.

SART : Meditators ( $n = 38$ ), Non meditators ( $n = 27$ ). Stroop Interference, Stroop Facilitation & RT:s: Meditators ( $n = 37$ ), Non meditators ( $n = 26$ ). Stroop errors: Meditators ( $n = 37$ ), Non meditators ( $n = 25$ ). Age was controlled for in all analyses. None of the differences between non-meditators and experienced meditators were significant. One outlier was detected and removed from the analysis.

Table 2.  
Comparison between meditators and non-meditators on mindfulness and psychological well-being

Scale	Meditators	Non-meditators	<i>t</i> (66)	<i>p</i>
	M (SD)	M (SD)		
Non-Reactive	25.84 (4.29)	20.70 (2.67)	6.05*	<.001
Observing	31.08 (4.61)	25.40 (5.19)	4.77	<.001
Acting with awareness	29.45 (4.92)	26.63 (4.41)	2.45	<.05
Describing	31.60 (4.68)	29.13 (5.88)	1.93	.06
Non-Judging	32.16 (5.68)	29.37 (4.77)	2.16	<.05
FFMQ Total	150.13 (17.94)	131.23 (14.03)	4.74	<.001
PWB Total	87.82 (7.45)	83.60 (10.06)	1.92*	.06

*Note.* Range of scores is 8-40 for Observing, Acting with awareness, Describing and Non-Judging, 7-35 for Non-Reactive, and 18-108 for PWB. Non-Reactive\* *t*(62,9); PWB Total\* *t*(51,9).

Table 3.  
Simple mediation analyses, with direct and indirect effects, controlling for age and gender.

	Non-Reactive	Observing	Describing	Acting with awareness	Non-Judging
<i>Direct effects</i>					
Meditation on mindfulness	0.85/0.47 (0.27)**	1.00/0.45 (0.27)**	0.42/0.19 (0.25)	0.56/0.28 (0.32)	0.65/0.27 (0.34)
Mindfulness on well-being	0.97/0.44 (0.20)**	0.33/0.18 (0.22)	0.38/0.21 (0.19)*	0.66/0.34 (0.23)**	0.60/0.36 (0.17)**
<i>Indirect effect</i>					
Meditation on well-being through mindfulness	0.82/0.21 (0.36)*	0.33/0.08 (0.23)	0.16/0.04 (0.12)	0.37/0.09 (0.27)	0.39/0.10 (0.26)

*Note.* Unstandardized/standardized parameters are reported with standard errors within brackets. Age and gender are controlled for in all analyses. \*\* *p* < 0.01, \* *p* < 0.05.

Table 4.  
Total and specific indirect effects of meditation experience on psychological well-being through the mindfulness facets, estimated in a multiple mediation model with all mindfulness facets included simultaneously in the model.

	Parameter/standardized parameter (standard error)
<i>Total indirect effect</i> (all FFMQ facets)	1.00 / 0.26 (0.48)*
<i>Specific indirect effects</i>	
Non-Reactive	0.55 / 0.14 (0.30)
Observing	0.02 / 0.01 (0.20)
Describing	0.03 / 0.01 (0.09)
Acting with awareness	0.20 / 0.05 (0.20)
Non-Judging	0.20 / 0.05 (0.20)

*Note.* Unstandardized / standardized parameters are reported with standard errors within brackets. Age and gender are controlled for in all analyses. \* *p* < .05

Table 6.  
Mediating effects of decentering in the relations between mindfulness and psychological well-being, and mindfulness and anxiety.

Psychological health variable (dependent variable)	Direct effect of mindfulness on decentering	Direct effect of mindfulness on psychological health	Total effect of mindfulness on psychological health (Controlling for decentering)	Total effect of decentering on psychological health (Controlling for mindfulness)	Bootstrap results for indirect effect $\alpha\beta$ (SE) (95% CI)
	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	Coefficient (SE)	
PWB 1	0.13 (0.14)***	0.13 (0.02)***	0.08 (0.02)***	0.36 (0.09)**	0.05 (0.02) (0.02, 0.08)*
PWB 2	0.10 (0.02)***	0.09 (0.02)**	0.03 (0.02)	0.55 (0.14)**	0.06 (0.02) (0.03, 0.09)*
PWB 3	0.03 (0.02)	0.09 (0.02)**	0.10 (0.02)***	-0.30 (0.15)	-0.01 (0.01) (-0.03, 0.00)
PWB 4	0.09 (0.03)**	0.12 (0.03)***	0.10 (0.03)**	0.19 (0.10)	0.02 (0.02) (0.00, 0.04)*

Note.  $p < .05^*$ ,  $p < .01^{**}$ ,  $p < .001^{***}$ . PWB 1: cross-sectional models on the total sample. PWB 2: pre-test mindfulness, post-test decentering and post-test PWB on the two active intervention groups. PWB 3: pre-test mindfulness, decentering pre-post change and post-test PWB on the two active intervention groups. PWB 4: pre-post change scores; mindfulness change, decentering change, and PWB change on the two active intervention groups.





Table 5. Pre- and post means, sd:s, *F*- and *p*-values, effect sizes, and observed power of the one way ANCOVAs on all variables.

Variable	Mindfulness		Relaxation		Wait-list		<i>F</i> ( <i>df</i> )	<i>p</i>	$\eta^2$	Obs power
	Pre M(SD)	Post M(SD)	Pre M(SD)	Post M(SD)	Pre M(SD)	Post M(SD)				
Non-Reactive	17.45(2.9)	18.97(2.6)	17.45(3.6)	18.60(2.8)	15.08(3.4)	17.03(3.3)	1.84(2,98)	0.16	0.04	0.38
Observing	23.87(4.0)	26.00(3.1)	23.09(3.1)	24.37(4.1)	21.83(4.1)	22.93(4.2)	3.04(2,98)	0.05	0.06	0.58
Acting with awareness	15.53(3.7)	16.45(2.8)	15.29(3.6)	15.80(3.3)	13.57(3.5)	14.73(3.4)	0.92(2,98)	0.40	0.02	0.20
Describing	21.68(4.4)	22.45(3.0)	20.89(3.8)	22.23(3.5)	20.60(4.4)	20.37(4.7)	5.52(2,98)	< 0.01	0.10	0.84
Non-Judging	15.55(3.9)	16.71(3.6)	15.80(4.0)	16.71(3.8)	14.77(3.1)	15.20(3.5)	2.58(2,98)	0.08	0.05	0.50
FFMQ total	94.08(13.1)	100.58(9.4)	92.60(11.2)	97.71(10.2)	86.57(12.9)	90.27(13.4)	5.45(2,98)	< 0.01	0.10	0.84
Decentering	3.07(0.5)	3.41(0.4)	3.16(0.5)	3.46(0.5)	2.91(0.6)	3.14(0.7)	1.50(2,98)	0.23	0.03	0.31
PWB total	4.46(0.6)	4.72(0.6)	4.60(0.5)	4.74(0.5)	4.45(0.7)	4.45(0.6)	6.62(2,98)	< 0.01	0.12	0.90
Anxiety	8.22(4.5)	5.92(3.6)	7.42(4.2)	5.20(3.6)	8.60(4.4)	6.93(3.8)	0.27(2,98)	0.76	0.00	0.09
Depression	3.72(2.8)	2.90(2.6)	3.35(2.0)	2.46(2.2)	3.75(2.3)	3.77(2.5)	1.61(2,98)	0.20	0.03	0.33
Probl.focused coping	2.93(0.3)	3.02(0.3)	2.81(0.3)	2.93(0.3)	2.91(0.3)	2.96(0.3)	0.94(2,98)	0.39	0.02	0.21
Emot.focused coping	2.57(0.3)	2.56(0.3)	2.47(0.3)	2.51(0.3)	2.61(0.3)	2.51(0.3)	2.68(2,98)	0.08	0.05	0.51
Avoidant coping	1.71(0.5)	1.61(0.3)	1.74(0.3)	1.67(0.4)	1.72(0.5)	1.71(0.4)	1.69(2,98)	0.19	0.03	0.35
Stroop int (I-C)	234.(415.3)	71.4(91.57)	264.3(246.6)	124.5(143.5)	120.4(121.7)	86.3(88.9)	1.27(2,69)	0.29	0.04	0.27
Stroop int (I-N)	254.9(340.2)	70.4(89.3)	277.5(266.7)	107.7(148.8)	129.7(144.1)	66.1(84.7)	0.55(2,69)	0.58	0.02	0.14
Stroop errors	1.8(3.8)	0.4(1.6)	3.2(6.7)	0.9(1.8)	0.9(1.6)	0.7(2.0)	1.51(2,69)	0.23	0.04	0.59
Stroop RT	1178(619.4)	890.2(178.5)	1201.7(360.3)	983.8(259.6)	962.5(245.3)	846.2(178.8)	0.53(2,69)	0.59	0.02	0.31

*Note.* Range of scores is 7-35 for Observing, 5-25 for Acting with awareness and Non-Judging, 6-30 for Describing and Non-Reactive, 29-145 for FFMQ total scale. The HAD scales (Anxiety and Depression): range from 0-21. PWB total scale and the Coping style scales are mean scale scores. For Stroop RT (reaction time), Stroop Interference, means and sd:s are in msec. I-C = incongruent – congruent, I-N= incongruent – neutral. For FFMQ, Decentering, PWB, HAD, and Cope styles: the mindfulness group (*n* = 38), the relaxation group (*n* = 35), and the wait-list

group ( $n = 30$ ). The Stroop variables: the mindfulness group ( $n = 21$ ), the relaxation group ( $n = 24$ ), and the wait-list group ( $n = 29$ ). The pre-test and education were controlled for in all analyses.