

MEASURING MINDFULNESS

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The commitment to evidence-based practice in clinical psychology requires scientific investigation of the effects of treatment and mechanisms of change. Empirical evidence suggests that mindfulness-based treatments provide clinically meaningful improvement for people suffering from many important problems, including depression, anxiety, pain, and stress. However, the processes of change that produce these beneficial outcomes are not entirely clear. Central questions include whether mindfulness training leads to increases in the general tendency to respond mindfully to the experiences of daily life, and if so, whether these changes are responsible for the improvements in mental health that are often observed. Answering these questions requires methods for assessing mindfulness. Several tools for this purpose are now available and early evidence suggests that they are useful and informative, despite shortcomings that require additional work. This paper summarizes the rationale for mindfulness questionnaires, the methods used to construct them, and research findings on their utility. Challenges related to maintaining consistency with Buddhist conceptions of mindfulness while applying psychological research methods to the study of its assessment are discussed.

Measuring mindfulness

The field of clinical psychology is increasingly committed to science as a foundation for clinical practice. This commitment requires that assessment and treatment of persons seeking help for psychological difficulties must be guided by the best scientific literature. Whenever possible, clinicians engaged in evidence-based practice provide treatments with strong scientific support for their efficacy. Newly developed treatments are considered experimental until scientific evidence of their effectiveness has been published in peer-reviewed journals. Standards of effectiveness may vary with the conditions and populations being studied, and the optimal methods for demonstrating effectiveness are topics of ongoing discussion. In general, however, empirically oriented clinical psychologists agree that scientific research is the most reliable source of knowledge about the best ways to alleviate psychological suffering. Empirical research is also essential for insuring that our treatments are not harmful and for understanding the aspects of mind and brain that underlie the alleviation of suffering.

Scientific study of the effectiveness of treatment requires measurement of the problems for which people seek help. As the commitment to scientific

evidence in clinical psychology has grown, so has the array of methods available to measure the severity of unpleasant symptoms and maladaptive behaviours, such as depression, anxiety, disordered eating, substance abuse, and many others. A large body of literature demonstrates that many psychological difficulties can be treated effectively. Typically, this means that participants in treatment show significant and meaningful reductions in the symptoms for which they sought help. In some cases, it means that treatment leads to meaningful increases in quality of life, or reductions in stress, in spite of an incurable condition such as a chronic illness. In accordance with the rules of scientific evidence, research designs usually provide a strong indication that the improvements were attributable to the treatment, rather than to extraneous factors such as the passage of time or placebo effects.

Until recently, research on the effectiveness of psychological treatments focused primarily on *whether* they lead to improved mental health. However, as confidence in the effectiveness of psychological treatments has grown, attention has increasingly turned to the processes that account for *how* these treatments work. For example, numerous studies show that a variety of treatment approaches lead to substantial reductions in depression. But why is this so? Is it because people's thinking patterns become less distorted, or because their relationships with others become healthier, or because they become more actively engaged in rewarding activities? Answering such questions allows us to increase the effectiveness of treatment by refining the components that are responsible for therapeutic change and de-emphasizing or letting go of components that do not contribute to improvement. Thus, studies that measure the severity of symptoms before and after treatment are necessary but not sufficient. Understanding how treatments work requires that the hypothesized processes of change must be measured. Thus, if a treatment approach is designed to relieve depression by teaching people to think in less distorted ways, then studies of this treatment should measure the extent of distortion in people's thinking before and after treatment, and should examine whether the degree of change in distorted thinking is related to the degree of improvement in depression.

Within scientific clinical psychology, mindfulness-based treatments have generated considerable interest. Although more familiar treatments are effective for many people, some participants show only partial improvement or no improvement. Thus, the need for additional work is recognized. Approaches that propose new ideas and methods may be welcomed, especially if their theoretical and conceptual basis is well articulated and preliminary evidence suggests that they are effective. Empirical study of mindfulness-based approaches is relatively recent; however, the literature is growing rapidly and suggests that interventions such as mindfulness-based stress reduction (MBSR; Kabat-Zinn 1982, 1990) and mindfulness-based cognitive therapy (MBCT; Segal, Williams, and Teasdale 2002), among others, produce clinically significant improvements for people suffering from many important problems, including depression, anxiety, pain, and stress. Treatments that integrate mindfulness training with a variety of other strategies,

such as dialectical behaviour therapy (DBT; Linehan 1993) and acceptance and commitment therapy (ACT; Hayes, Strosahl, and Wilson 1999) also have strong empirical support for their efficacy.

However, it is not entirely clear *how* mindfulness-based treatments produce their beneficial outcomes. Addressing this question requires measuring the processes of change that are believed to account for the benefits of mindfulness training. It seems reasonable to assume that teaching participants to practice mindfulness meditation or mindfulness skills should cultivate their ability to respond mindfully to the experiences of daily life, including sensations, cognitions, and emotions, as well as sights, sounds, and other environmental stimuli. In turn, increased mindfulness in daily life is believed to lead to reductions in suffering (Goldstein and Kornfield 1987). Because a scientific approach requires that we test these assumptions empirically, researchers have begun to ask, 'Does mindfulness training lead to increased mindfulness in daily life?' and 'is this why mindfulness-based interventions are beneficial?' These questions cannot be answered without methods for measuring mindfulness. Although this task appears very challenging, psychologists have begun to consider how it might be done.

Methods for assessing psychological variables

Psychologists have developed many methods for assessing human behaviours, characteristics, and psychological functions. Some of these methods are more applicable than others to the study of mindfulness. For example, direct observation by trained observers has contributed greatly to the understanding of many forms of overt behaviour, such as types of play in young children, self-harm in developmentally disabled persons, and ways of arguing in married couples, among numerous others. Mindfulness is probably not well suited to such methods because it is not readily observable by others. Physiological markers of behaviours such as smoking, alcohol consumption, and drug use can be assessed in willing participants with breath or urine tests. However, no such markers of mindfulness in daily life have been identified. Scanning technologies can be used to study the brains of people who practice mindfulness meditation. Although these methods are yielding fascinating results in both long-term meditators and participants in mindfulness-based interventions, it is not clear that brain scans can be used to quantify the general tendency to be mindful in daily life. Computer-based or other cognitive tests can provide objective measures of a wide range of abilities. This approach has been used in several studies of mindfulness and some researchers have reported associations between mindfulness training and improvements in capacities such as sustained attention and working memory (Jha, Krompinger, and Baime 2007; Jha et al. 2010). However, findings are mixed, and although these capacities may be related to mindfulness, it does not appear that mindfulness is synonymous with sustained attention, working memory, or other previously recognized cognitive capacities. An objective test of mindfulness has not been developed.

Another assessment strategy is to ask people to describe their thoughts, feelings, or likely behaviours in response to open-ended questions or vignettes. Responses are recorded and transcribed and then can be analysed by trained coders. The Measure of Awareness and Coping in Autobiographical Memory (MACAM; Moore, Hayhurst, and Teasdale 1996) uses these methods to assess decentring, which is closely related to mindfulness. The psychological literature defines decentring as the ability to observe thoughts and feelings as transitory mental events that do not necessarily reflect reality, truth, or self-worth, are not necessarily important, and do not require particular behaviours in response. The MACAM is a vignette-based interview in which participants are asked to imagine themselves in several mildly distressing situations, such as waiting for a friend who does not show up for a lunch date. They are asked to recall specific occasions from their own lives that are brought to mind by the emotions that the vignettes generated, and to describe these occasions in detail, including their feelings in the situation and how they responded to them. Trained coders rate the responses for the extent to which they demonstrate a decentred stance, defined as awareness of thoughts and feelings as separate from the self. Lower ratings are given for descriptions that suggest being swamped or immersed in undifferentiated thoughts and feelings (feeling 'awful') whereas higher ratings are given for noticing specific thoughts and feelings and recognizing that they can step back from them or let them go. Research shows that the MACAM can be scored reliably and that scores are related in theoretically meaningful ways to important variables, such as recovery from depression and likelihood of experiencing a future episode. Further, the meta-awareness assessed by this procedure has been shown to change with participation in a mindfulness program (Hargus et al. 2010). However, the MACAM is difficult and time-consuming to use. It requires a lengthy one-on-one interaction with a trained interviewer as well as trained coders to rate the responses. These difficulties prompted the recent development of a self-report questionnaire to assess decentring.

Self-report questionnaires are popular for several reasons. They are convenient and efficient and can provide reliable and valid information if they are well constructed for the populations in which they will be used. They serve a vital role in psychological research because many of the variables of interest to clinical psychologists, such as thoughts, emotions, and other mental processes, are observable primarily by the person experiencing them. The most practical way to learn about these psychological variables is to ask people about them. Questionnaires provide a means of asking systematically, in ways that are standardized to permit comparisons between individuals and within individuals over time. Psychologists have developed countless questionnaires over a period of decades. They measure a huge variety of psychological variables, ranging from the relatively narrow (eating expectancies) to the very broad (personality). Many such questionnaires have been used in outcome studies of mindfulness to assess reductions in stress, anxiety, and depression; increases in self-coherence, resilience, and self-compassion; and to predict drop-out from mindfulness

programmes. A set of principles and procedures guides the development and evaluation of psychological questionnaires (see Clark and Watson 1995, for an overview). In recent years these methods have been applied to the development of questionnaires designed to measure mindfulness itself. Several mindfulness questionnaires are now available in the published literature. Like most questionnaires, they consist of series of statements (known as items) that respondents rate according to how well each statement describes themselves, often on a scale of 1–5 in which 1 = *not at all true of me*, 3 = *moderately true of me*, and 5 = *very true of me*. Most mindfulness questionnaires are designed to assess the general tendency to be mindful in daily life.

The development of mindfulness questionnaires

What are we measuring?

The first step in constructing a questionnaire is to develop a detailed description of the variable to be measured, usually based on a comprehensive review of the relevant literature. This step is uniquely challenging in the case of mindfulness. Because most psychologists are not Buddhist scholars, the development of mindfulness questionnaires has relied largely on literature written by psychologists who have studied mindfulness or by teachers who have worked to make mindfulness accessible to non-Buddhist Westerners. Several psychologists have noted that the meaning of mindfulness is subtle and elusive and that defining it in precise terms is difficult (Block-Lerner, Salters-Pednault, and Tull 2005; Brown and Ryan 2004). However, numerous definitions and descriptions of mindfulness are available. Perhaps the most well known is an operational definition provided by Kabat-Zinn (1994) who describes mindfulness as ‘paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally.’ In a later paper, Kabat-Zinn (2003) also suggests that mindfulness includes ‘an affectionate, compassionate quality within the attending, a sense of openhearted, friendly presence and interest.’ Brown and Ryan (2003) define mindfulness as ‘the state of being attentive to and aware of what is taking place in the present.’ Similarly, Marlatt and Kristeller (1999) define mindfulness as ‘bringing one’s complete attention to the present experiences on a moment-to-moment basis.’ They also suggest that mindfulness involves observing experiences ‘with an attitude of acceptance and loving kindness.’ In a somewhat more elaborated description, Segal, Williams, and Teasdale (2002) state that ‘... in mindfulness practice, the focus of a person’s attention is opened to admit whatever enters experience, while at the same time, a stance of kindly curiosity allows the person to investigate whatever appears, without falling prey to automatic judgments or reactivity.’ They also note that mindfulness can be contrasted with behaving mechanically, or without awareness of one’s actions, in a manner often called *automatic pilot*. Bishop and colleagues (2004) suggest that mindfulness includes bringing ‘nonelaborative awareness to current experience’

with an orientation of 'curiosity, experiential openness, and acceptance.' While any of these definitions may leave out some significant elements, all seem to capture at least some of the qualities that mindfulness teachers would recognize as important.

Instructions that are commonly used in teaching mindfulness classes provide another source of information about the nature of mindfulness, especially for questionnaire developers, who are often interested in assessing the skills that contemporary mindfulness-based treatments are teaching. These treatments use a variety of methods to teach mindfulness. Some are formal meditation practices whereas others are less formal exercises for cultivating mindfulness in everyday life. Several instructions are common to most mindfulness practices. Participants are typically encouraged to focus their attention on stimuli that are observable in the present moment, such as the sensations and movements of breathing or sounds that can be heard in the environment. If thoughts, emotions, urges, or sensations arise, participants are instructed to observe them closely, and, as best they can, without judgment. Brief, covert labeling of observed experiences, using words or short phrases, is sometimes suggested. For example, participants might silently say, 'thinking,' 'aching,' or 'sadness is here' as their experiences come and go. When practicing mindfulness in daily life, participants are encouraged to bring moment-to-moment awareness to ordinary activities such as eating, walking, or washing dishes, and to gently return their attention to this activity when it wanders away. They are typically asked to bring an attitude or stance of acceptance, allowing, openness, curiosity, kindness, and friendliness to all observed experiences, even if they are unpleasant or unwanted.

Most mindfulness questionnaires are based on definitions, descriptions, and instructions such as these. Many include items that provide examples of the tendency to notice, observe, or pay attention to internal or external present-moment experiences. Items that describe awareness of ongoing activity are very common. Most mindfulness questionnaires also include items that describe taking an accepting, non-judgmental, non-reactive, or non-avoidant stance toward observed experiences. Some include responding to observed experiences with curiosity, kindness, or openness and some include items about noting or labelling observed experiences with words. Most of these questionnaires treat mindfulness as a dispositional or trait-like variable that is roughly consistent over time and across situations. However, it is assumed that the tendency to respond mindfully to daily life experiences is subject to change with practice. Indeed, a central purpose of these questionnaires is to assess changes occurring over the course of a mindfulness-based intervention or a long-term mindfulness practice.

Principles of questionnaire construction

An important principle governing the construction of questionnaires is that, in most circumstances, they should be usable by ordinary people. The general population includes a wide range of education levels and reading skills. Some

people may have little knowledge of the variable being measured. For example, although many people probably have idiosyncratic understandings of depression, most are not familiar with the technical terms and diagnostic criteria currently used by mental health professionals. Therefore, depression questionnaires typically use ordinary language to assess common experiences that represent elements of depression, such as feeling sad or guilty, feeling like a failure, having trouble sleeping or concentrating, or losing interest in things, among others. Most people can rate how well such items describe themselves, regardless of their knowledge of or experience with depression.

A related principle of questionnaire design is that each item should assess only one characteristic or idea. For example, 'I avoid social gatherings because I don't like making conversation' is potentially problematic because it contains two distinct topics (avoiding social gatherings and disliking conversation) that might be differentially true for some people. Although some will find this item easy to rate, others may find it puzzling if, for example, they like conversation but avoid social gatherings for another reason, or if they attend gatherings in spite of conversation difficulties. Responses to items like this can be difficult to interpret.

A common practice in writing questionnaires is to include items that directly describe the variable to be measured as well as items that describe its opposite or its absence. For example, the tendency to experience anger can be assessed with items such as 'I am short-tempered' and 'I get irritated easily' or with items such as 'I keep my cool' and 'it takes a lot to make me angry.' With the latter type of item (known as reverse-scored), the scorer reverses the rating before it is added to the total so that high scores consistently reflect a greater tendency to be angry (ratings of 1 are changed to 5, while 5 is changed to 1, and so on). Experts have long recommended that questionnaires include both directly worded and reverse-scored items so that tendencies to be acquiescent or oppositional can be balanced (Nunnally 1967; Paulhus 1991). Reverse-scored items are very common; however, they can occasionally be problematic. For example, if poorly written they can cause confusion, especially if they create double negatives (is it not true of me that I don't always keep my cool?). In some cases, reverse-scored items may not measure the same concept as directly worded items (Rodebaugh, Woods, and Heimberg 2007). On balance, however, reverse-scored items are generally believed to serve useful purposes.

Since a single item that uses simple language to assess a single idea cannot capture all of the relevant content for any important psychological variable, questionnaires typically have multiple items. For example, the most commonly used questionnaires that assess depression and anxiety each have about 20 items. Ratings are summed to quantify the extent to which the respondent is depressed or anxious. The need for ordinary language also can create the false impression that the resulting questionnaire is simplistic or superficial. In reality, extensive knowledge of the variable in question is needed to write items that represent it in simple terms.

To a large extent, the developers of mindfulness questionnaires have endeavoured to follow the principles just described. Many have assumed that it is useful to assess mindfulness in ordinary people, most of whom have no explicit knowledge of mindfulness or experience with meditation. This assumption is based on the idea that mindfulness is an inherent human capacity that (like most human capacities) varies in the general population, even in the absence of mindfulness training. That is, some people are naturally inclined to be mindful in daily life, some are inclined to be quite unmindful much of the time, and others fall in the middle of the range. As Kabat-Zinn (2003) stated, 'We are all mindful, to one degree or another, moment by moment.' However, it is not useful to ask people explicitly to rate how mindful they are, because they are likely to have idiosyncratic understandings (or no understanding) of what this term means. Instead, ordinary language must be used to describe common and recognizable experiences that are consistent with mindfulness (or a lack of mindfulness), such as noticing sensations in the body, doing something without paying attention, or trying to avoid unpleasant thoughts. That is, the use of everyday language is intended to insure that respondents need not have an understanding of mindfulness in order to complete the questionnaire. They need only to understand the language of each item. Reverse-scored items have been found to be useful for this purpose, perhaps because experiences of mindlessness (doing things automatically) are easily recognizable for most people. Finally, because mindfulness appears to have several elements or facets, an individual item cannot cover all of the relevant content (awareness, non-judging, non-reactivity and so on). Instead, ratings of many items are summed to provide an indication of the respondent's general tendency to be mindful in daily life.

Because writing good items is both difficult and critically important, questionnaire developers commonly ask independent experts to rate the quality of their items on several dimensions. Most developers of mindfulness questionnaires have asked experienced mindfulness teachers or practitioners to rate their items for clarity and for how well they represent the meaning of mindfulness in ordinary language. Items with poor evaluations by experts are usually modified or deleted. The questionnaire is then administered to large groups of respondents and scores are analysed with a variety of statistical methods. Items may be added, deleted, or modified during this process. In this way, most questionnaires evolve over several iterations. The version that is published in a peer-reviewed journal has typically been extensively studied. Following is a brief description of the mindfulness questionnaires that have been published so far. Table 1 lists these with examples of items from each.

Published mindfulness questionnaires

The Freiburg Mindfulness Inventory (FMI; Buchheld, Grossman, and Walach 2001) is a 30-item questionnaire assessing non-judgmental present-moment observation and openness to negative experience. The original version was

developed with participants in mindfulness meditation retreats and (it is important to note) was designed for use with experienced meditators. Thus, the meaning of some items may be unclear to persons without meditation experience. A later version (Walach et al. 2006) consisting of 14 of the original items, was developed for use with nonmeditating populations. The items shown in Table 1 appear on both versions.

The Mindful Attention Awareness Scale (MAAS; Brown and Ryan 2003) is a 15-item instrument measuring attention to and awareness of present-moment experience in daily life. Items describe characteristics that are inconsistent with mindfulness, such as acting on automatic pilot, being preoccupied, and not paying attention to the present moment. Ratings are then reversed so that high scores represent high levels of mindfulness.

TABLE 1

Published mindfulness questionnaires and example items

Freiburg Mindfulness Inventory

I am open to the experience of the present moment.

I sense my body, whether eating, cooking, cleaning, or talking.

When I notice an absence of mind I gently return to the experience of the here and now.

Mindful Attention Awareness Scale

I find myself doing things without paying attention. (R)

I break or spill things because of carelessness, not paying attention, or thinking of something else. (R)

It seems I am "running on automatic" without much awareness of what I'm doing. (R)

Kentucky Inventory of Mindfulness Skills

When I'm walking, I deliberately notice the sensations of my body moving.

I'm good at finding the words to describe my feelings.

When I do things, my mind wanders off and I'm easily distracted. (R)

I tell myself that I shouldn't be feeling the way I'm feeling. (R)

Cognitive and Affective Mindfulness Scale - Revised

I am able to focus on the present moment.

I am preoccupied by the past. (R)

I am able to accept the thoughts and feelings I have.

Southampton Mindfulness Questionnaire

When I have distressing thoughts or images, I am able just to notice them without reacting.

When I have distressing thoughts or images, I judge the thought or image as good or bad. (R)

When I have distressing thoughts or images, in my mind I try and push them away. (R)

Five Facet Mindfulness Questionnaire

(This is a composite of the preceding five questionnaires and includes items from each.)

Philadelphia Mindfulness Scale

I am aware of what thoughts are passing through my mind.

When someone asks how I'm feeling, I can identify my emotions easily.

I tell myself that I shouldn't have certain thoughts. (R)

Toronto Mindfulness Scale

I was curious to see what my mind was up to from moment to moment.

I was receptive to observing unpleasant thoughts and feelings without interfering with them.

I approached each experience by trying to accept it, no matter whether it was pleasant or unpleasant.

Note: R = reverse-scored item

The Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, and Allen 2004) is a 39-item instrument designed to measure four elements of mindfulness: observing present-moment experiences, describing (applying verbal labels), acting with awareness, and accepting present-moment experiences without judgment. It was based largely on the conceptualization of mindfulness skills in DBT, although efforts were made to be consistent with descriptions of mindfulness in MBSR and MBCT and with writings by meditation teachers such as Goldstein and Kornfield (1987), Gunaratana (2002) and Rosenberg (1998).

The Cognitive and Affective Mindfulness Scale–Revised (CAMS-R; Feldman et al. 2007) is a 12-item questionnaire designed to measure attention, awareness, present-focus, and acceptance and non-judgment of thoughts and feelings in general daily life.

The Southampton Mindfulness Questionnaire (Chadwick et al. 2008) is a 16-item instrument designed to measure elements of mindfulness when unpleasant thoughts and images arise, including mindful observation, letting go, non-aversion, and non-judgment.

The Five Facet Mindfulness Questionnaire (FFMQ; Baer et al. 2006) is a 39-item composite of the five instruments just described. Empirical and statistical procedures were used to identify and select the items from these questionnaires with the strongest psychometric properties. The FFMQ measures five elements of mindfulness: observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience.

The Philadelphia Mindfulness Scale (PHLMS; Cardaciotto et al. 2008) is a 20-item questionnaire designed to measure two dimensions of mindfulness: awareness and acceptance. Awareness items assess noticing or observing of internal and external experiences. Acceptance items assess non-judging and openness to experience and refraining from attempts to escape or avoid them.

The Toronto Mindfulness Scale (Lau et al. 2006) measures the attainment of a mindful state during an immediately preceding mindfulness exercise. Participants first practice a 15-minute meditation exercise and then rate the extent to which they were mindful of their experience during the exercise. The TMS includes two factors: curiosity about (or interest in) inner experiences and decentering from experiences (awareness of them without being caught up in or carried away by them). A modified version of the TMS (Davis, Lau, and Cairns 2009) made small changes to the items in order to measure the same tendencies in general daily life. For example, instead of 'I was curious about each of my thoughts and feelings as they occurred' this version reads, 'I am curious about each of my thoughts and feelings as they occur.'

Evaluating mindfulness questionnaires

The published literature provides encouraging evidence that the mindfulness questionnaires just described are reasonably sound. For example, scores for most of them are significantly correlated with each other. This suggests that

their authors have similar (though not identical) conceptions of the general nature of mindfulness in daily life. An exception to this pattern is the original version of the Toronto Mindfulness Scale, which does not measure mindfulness in daily life, but instead measures mindfulness during a particular mindfulness exercise. Most mindfulness questionnaires are correlated with psychological characteristics that, theoretically, should be related to mindfulness. For example, because mindfulness includes allowing thoughts to come and go on their own time, it should be negatively correlated with thought suppression (the tendency to try to get rid of unwanted thoughts). Similarly, mindfulness involves a particular type of attention to emotions and therefore should be positively correlated with emotional intelligence. Research consistently supports these patterns (Baer et al. 2006; Brown and Ryan 2003). A recent neuroimaging study (Way et al. 2010) found significant negative correlations between self-reported mindfulness (measured with the MAAS) and amygdala activity (which is associated with depression), providing preliminary evidence that self-reported mindfulness is associated with objectively measured brain activity.

Participants in MBSR and MBCT have shown significant increases in mindfulness scores over the course of treatment, suggesting that they are learning to be more mindful in daily life (Carmody and Baer 2008; Kuyken et al. 2010). In MBSR participants, Carmody and Baer (2008) found that improvements in self-reported mindfulness (as measured by the FFMQ) were strongly correlated with time spent in home mindfulness practice (as recorded in weekly diaries) and with the extent of reduction in psychological symptoms and stress. Statistical analyses suggested that the increase in mindfulness skills brought about by home practice was responsible for the observed improvements in psychological health. These findings provide the first empirical evidence for the idea that practicing mindfulness leads to increased mindfulness in daily life, which in turn reduces psychological suffering. Similarly, depressed persons who completed MBCT showed increases in mindfulness skills (measured with the KIMS) that predicted reduced depression 15 months later (Kuyken et al. Forthcoming).

Other evidence for the validity of mindfulness questionnaires comes from studies of long-term meditators, who have shown higher scores than non-meditators on several of these measures (see Baer, Walsh, and Lykins 2009, for a review). A recent comparison of meditators and non-meditators (Baer et al. 2008) found that the development of mindfulness skills in daily life (as measured by the FFMQ) appeared to be responsible for the improved psychological wellbeing that was associated with extent of meditation experience. Overall, the research literature suggests that data from mindfulness questionnaires show patterns that are consistent with theoretical expectations. Thus, they appear to be useful tools for studying the nature of mindfulness and are providing important information about the fruits of mindfulness training for psychological functioning.

However, mindfulness questionnaires have also been met with skepticism. Some of the objections to mindfulness questionnaires apply to all self-report instruments. Questionnaires can be subject to biases in which respondents

misrepresent themselves, either deliberately or unconsciously. In the case of mindfulness questionnaires, people who recognize the mindfulness-consistent response may rate themselves as highly mindful, regardless of their true tendencies, especially if the circumstances create a demand for such a pattern. Experienced meditators, for example, may wish to create the impression that their practice has made them very mindful, or they may genuinely perceive that it has, when in reality their tendency to be mindful is weaker than they report. Similarly, participants in MBSR or MBCT, who have just spent eight weeks engaged in the intensive practice of mindfulness meditation, may show a deliberate or unconscious bias toward reporting large increases in their tendency to be mindful, regardless of the real effects of treatment.

While such biases are possible, it is unlikely that they account for the promising findings with mindfulness questionnaires. Response biases have been recognized for decades and psychologists have studied them extensively. Substantial response biases are observed primarily in settings where important personal consequences (such as gaining custody of one's children or being hired for a desirable job) depend on the findings of the assessment. When responses are anonymous or confidential and have no consequences for participants, distortion appears to be rare (Costa and McCrae 1992b). The mindfulness literature shows that many participants are willing to provide data that are inconsistent with positive biases. For example, in studies that include home practice times, the average amount of self-reported home practice is often much less than was recommended. Furthermore, although outcomes for MBSR are generally positive, some studies show only small effects, suggesting that participants who experienced little benefit are willing to say so. Research in other areas of psychology shows that self-reports often are significantly correlated with other methods of assessment. Self-reported personality traits are correlated with reports by spouses or peers, regardless of the desirability of the trait (warmth, altruism, hostility, impulsiveness; Costa and McCrae 1992a). Self-reported alcohol use corresponds reasonably well with both biochemical markers and spousal reports of drinking (Del Boca and Darkes 2003). This is especially encouraging because of the potential for response biases when people report on their alcohol use. To the extent that self-reports and other methods disagree, it should not be assumed that self-reports are necessarily less accurate. Biochemical markers can be influenced by extraneous factors. Reports by others, even if they know the person well, are not always based on the same information that is available to the self-reporter. Overall, the literature suggests that self-reports are generally useful. The recent mindfulness literature suggests that when they change during treatment, they predict important downstream consequences (Carmody and Baer 2008; Kuyken et al. 2010).

A related concern that is more specific to mindfulness questionnaires is that, even when respondents are being honest and candid, they are unable to report accurately on their own tendency to be mindful because they are unaccustomed to noticing these aspects of their own functioning. As noted earlier, questionnaire

developers have attempted to avoid this problem by writing items that use ordinary language to describe common experiences that most people recognize, even if they do not know that such experiences are consistent (or inconsistent) with mindfulness. For example, noticing how one's body is feeling, doing something without paying attention, and trying to get rid of negative thoughts appear to be familiar experiences, even for people with no mindfulness training. People should therefore be able to rate how often they have such experiences or how typical such experiences are for them. Research on mind-wandering shows that ordinary people are able to report on whether their minds were wandering at particular times during an experiment (Smallwood, McSpadden, and Schooler 2007), and that such reports correlate with cognitive measures such as how successfully they are able to generate random numbers (Teasdale et al. 1995). These findings imply that people can also report on such experiences in daily life.

An additional concern about mindfulness questionnaires is that knowledge and experience with mindfulness meditation may lead meditators and non-meditators to interpret the meaning of items in different ways. The use of ordinary language to describe common experiences is intended to circumvent this problem. However, empirical evidence suggests that items about noticing or observation of experiences (see the *observing* scales from the KIMS and FFMQ) function differently in meditating and non-meditating samples. Meditators seem to interpret *observing* to mean attending to experience in a non-judgmental and non-reactive way (consistent with mindfulness), whereas non-meditators appear to interpret *observing* as attending to experience in ways that might (or might not) be highly judgmental and reactive. These findings suggest that the *observing* items may provide misleading or confusing findings in non-meditating samples and should be used with caution. Modification or deletion of *observing* items may be helpful in the development of future mindfulness questionnaires.

Another recent study of meditators and non-meditators (Van Dam, Earleywine, and Danoff-Burg 2009) reported statistical evidence of differential item functioning for many FFMQ items. However, these findings are questionable on several grounds and a subsequent study (Baer, Samuel and Lykins, forthcoming) did not replicate them. Moreover, it is possible that differences between meditators and non-meditators in ways of understanding particular items are not always problematic. A similar pattern probably occurs for many psychological characteristics for which self-report questionnaires are well established. For example, people who have experienced major depressive episodes may have much more subtle and nuanced understandings of what it means to feel guilty, worthless, or suicidal than people who have never been depressed. This does not prevent never-depressed persons from providing useful responses on depression questionnaires that can be directly compared to responses from currently or previously depressed persons.

Regardless of how this specific issue is resolved, these recent findings illustrate an important benefit of questionnaire development: conceptualizing the variable to be measured by writing questionnaire items and then testing them

empirically provides evidence that contributes to refining the conceptualization, which in turn may lead to improved measurement strategies. In other words, we need research to reveal surprising results to understand better the underlying variable we are measuring, and how best to measure it. Efforts to assess mindfulness are very recent, compared with the assessment of long-recognized variables such as depression, anxiety, and personality. Thus, it is not surprising that some of these attempts have yielded unexpected findings.

In spite of their promising features, it is clear that mindfulness questionnaires are imperfect in a variety of ways. As noted earlier, the *observing* items appear to mean different things to meditating and non-meditating samples, especially when the non-meditators are undergraduate students. This has resulted in some anomalous findings. For example, in student samples, the *observing* scale from the FFMQ is positively correlated with both adaptive and maladaptive characteristics (openness to experience, emotional intelligence, psychological symptoms, thought suppression; Baer et al. 2006). In another recent study, smoking and binge drinking college students unexpectedly obtained higher scores on the Freiburg Mindfulness Inventory than non-drinking, non-smoking students (Leigh, Bowen, and Marlatt 2005). This difference was due to high levels of bodily awareness in the drinkers and smokers, again suggesting that non-meditating students may observe their bodily sensations in unmindful ways. In addition, the *describing* scales found on the KIMS and FFMQ are more relevant to some mindfulness training approaches than to others. The rationale for *describing* as an element of mindfulness questionnaires is that the tendency to say, 'Ah, sadness has arisen' or 'here are self-critical thoughts' reflects a mindful stance toward these experiences; they have been observed and noted in non-judgmental terms. However, describing is not uniformly emphasized in mindfulness training approaches, and the *describing* items do not necessarily capture the non-judging quality (it is possible to describe one's experiences judgmentally). Some authors also have expressed concern that the absence of a particular quality does not always imply the presence of its opposite (Grossman and Van Dam 2011), and that reverse-scored items are therefore problematic. While this is a valid concern, it does not apply to all variables. Although the absence of depression is not happiness (Reise and Waller 2009), a low rate of judging implies non-judging, and a low rate of 'doing things without paying attention' (Brown and Ryan 2003) implies a tendency to act with awareness. Thus, these particular reverse-scored items appear to be conceptually sound. The empirical evidence that they are problematic is debatable; however, the issue needs further study (Baer et al. forthcoming; Van Dam, Earleywine, and Danoff-Burg 2009).

Are questionnaires sufficient to the task of assessing mindfulness? It is widely acknowledged in psychology that most variables should be assessed with multiple methods. Convergence among methods increases confidence that we have measured what we intended to measure. Thus, alternatives to self-report for assessing mindfulness should be developed. The text analysis methods used by the MACAM to assess decentring (described earlier) might be adapted for the

study of mindfulness (as in Hargus et al. 2010). Ongoing work on computer-based tasks and brain-based assessment may lead to useful indicators of the tendency to be mindful in daily life. However, it should not be assumed that alternative methods will necessarily be more accurate or more useful than self-reports. All assessment methods are subject to error. Biological markers can be influenced by factors other than the variable under study. They also provide little information about the perceived experience of being mindful. Computer-based tests may not be representative of the same capacity in daily life. For these reasons, it is also important that work continue on improving self-report methods for assessing mindfulness. Toward this end, the ongoing flurry of research using the currently available measures, though lamented by Grossman and Van Dam (2011) as potentially harmful to this field of study, is probably advantageous. It is likely to clarify the strengths and weaknesses of these measures, which in turn should stimulate new ideas about better ways to proceed. The development of new measures designed to rectify the weaknesses of earlier ones is common in the psychological assessment literature. Intense interest in mindfulness suggests that new methods for its assessment will appear over time.

Mindfulness questionnaires and Buddhist conceptions of mindfulness

An important concern about mindfulness questionnaires is that they may not adequately represent the meaning of mindfulness as it is described in the Buddhist tradition. Most questionnaire developers have made strong efforts to be consistent with mindfulness as described Western interventions (MBSR, MBCT, DBT, ACT) and related papers in the psychological literature, and sometimes with contemporary writings by teachers such as Goldstein, Kornfield, and Hanh, among others. However, most do not claim knowledge of original Buddhist texts or their direct translations. Thus, inconsistencies with the original Buddhist conceptions are probably inevitable, for several related reasons. First is the need for secularization of mindfulness, if it is to be accessible to Western populations. Secularization has made the benefits of mindfulness training much more broadly available than would otherwise be possible. However, secularization also may have led to understandings of mindfulness within psychology that do not entirely capture the detail and subtlety of Buddhist teachings. A related factor is the need to define mindfulness in ways that make it amenable to scientific study within the discipline of psychology. For this purpose, it must be described in clear psychological terms. Finally, as noted earlier, most psychologists are not Buddhist scholars and must rely on secondary sources for an understanding of the systems of Buddhist thought and practice in which mindfulness is embedded. These factors suggest two general sources of inconsistency between mindfulness questionnaires and Buddhist conceptions of mindfulness. First, the questionnaires may reflect intentional adaptations made by treatment developers who are knowledgeable and experienced in Buddhist meditation practices, in efforts to

maximize feasibility and efficacy of mindfulness training for Western clinical populations. Second, questionnaires may include unintentional and unrecognized distortions of the Buddhist meanings of mindfulness stemming from incomplete knowledge of Buddhist writings.

Several approaches to this situation merit consideration. One is to increase communication between Buddhist scholars and psychologists working with mindfulness, as in this volume. The Buddhist tradition provides an incomparably rich source of knowledge about mindfulness, how it can be taught, and its role in the reduction of suffering. Thus, scholarly work on Buddhist texts and dialogues with teachers of mindfulness in the Buddhist traditions should play an important role in discussions of mindfulness in Western psychological science. It is possible that something important is lost when mindfulness is translated into Western psychological terms. If psychologists can understand more clearly what is lost, we may find ways to mitigate the losses and optimize our assessments and interventions, while maintaining a secular and scientific perspective.

It may also be helpful to remember the distinction between measuring a variable and manipulating it. When we measure a variable (such as mindfulness), we then examine how these measurements relate to other variables (thoughts, emotions, behaviours) and how they change with treatment. For some research purposes, an alternative to measuring mindfulness is to manipulate it. In these studies, we teach mindfulness or guide participants in practicing it and then assess emotions, cognitions, or behaviours soon afterwards. One recent study of this type (Sauer and Baer 2011) asked adults with borderline personality disorder who were in an angry mood to either ruminate or to practice mindfulness for eight minutes and then work on a difficult arithmetic task. Those who had practiced mindfulness persisted much longer in the difficult task than those who had ruminated. Studies like this do not attempt to measure mindfulness, and yet they provide important information about the effects of practicing mindfulness. However, because such studies are often conducted in experimental situations that are somewhat artificial, they tell us little about how mindfulness-based treatments improve mental health in daily life. Thus, both approaches (measuring and manipulating) are considered important methods of study.

Another approach to a lack of consistency with Buddhist conceptions of mindfulness is to recognize that science has its own rules and methods and its outcomes cannot always be predicted. Continued scientific work on the assessment of mindfulness and on mindfulness-based treatments may lead to a conceptualization of mindfulness that is more consistent with the original Buddhist teachings, especially if it is informed by ongoing dialogue with Buddhist teachers. On the other hand, psychological research may eventually suggest that the most helpful ways of conceptualizing and teaching mindfulness for Western clinical populations are not entirely consistent with the original Buddhist teachings. For example, DBT operationalizes mindfulness as a set of behavioural skills that were adapted from Zen practices (Linehan 1993) and do not require formal meditation. The KIMS (Baer, Smith, and Allen 2004), although generally

consistent with many accounts of mindfulness, is based largely on this conceptualization of mindfulness skills. Grossman and Van Dam (2011) caution that operationalizing in these ways risks trivializing and banalizing the Buddhist conception of mindfulness. However, clinical experience shows that the mindfulness skills in DBT provide rich and complex experiences for clients that can be deeply meaningful and often transformative. These skills, and recent efforts to assess them, are consistent with the overarching goal of the science of clinical psychology: to maximize the effectiveness of treatments and the understanding of the processes through which they work. In this endeavour, empirical enquiry using the best methods available, and revising our methods when we discover something better, is consistent with the ethics both of the foundational tradition of Buddhism, and of our science.

Conclusions

Within scientific clinical psychology, any treatment that claims to improve mental health by teaching a particular set of skills is subject to evaluation on several dimensions. It is necessary to show (according to the rules of science in this area) that participation in the treatment not only does not harm, but also leads to improvements in mental health that are not attributable to chance. It is also important to determine whether participants are learning what the treatment providers are teaching. If participants are not learning these skills, but their mental health is improving, then the treatment is probably working in unanticipated ways and might be more effective if more time were spent on active ingredients. If participants are learning the skills, and their mental health is improving, it is possible that the skills that are explicitly taught are responsible for the improvements in mental health. However, it is also possible that these skills have little to do with the beneficial outcomes and that improved mental health is due to other components of treatment. If this is the case, the treatment will be more effective if more effort is devoted to the elements that are responsible for the observed improvement. In order to determine whether participants are learning what the treatment is teaching, and whether beneficial outcomes should be attributed to this new learning or to other factors, we cannot avoid the challenge of measuring the processes that may account for therapeutic change.

This is admittedly a difficult challenge in most circumstances. In the case of mindfulness-based treatments, it is especially challenging. Mindfulness originates in ancient Buddhist traditions and is described in texts written long before the advent of Western science and in unfamiliar languages. It appears that understanding what the original Buddhist literature means by 'mindfulness' is not a simple matter. Given these realities, it is unlikely that Western psychologists' current understandings of mindfulness completely capture Buddhist teachings. In spite of these difficulties, the research literature suggests that teaching mindfulness in the forms that pioneering Western teachers such as Kabat-Zinn, Linehan, Goldstein, Kornfield, and Salzberg have developed is beneficial in many

ways and for many different problems and conditions. The commitment to scientific study requires that we apply the best available methods to understanding what we are teaching in mindfulness-based treatments, what our participants are learning, and how this new learning is helpful to them.

While contemplating these sobering responsibilities, let us acknowledge how far we have already come. Within only a few decades, potential benefits of mindfulness training have become available to huge numbers of Westerners, many of whom have been suffering from severe conditions, such as depression, chronic pain, and borderline personality disorder. Within even fewer years, enough scientific evidence has accumulated to suggest that mindfulness-based treatment approaches are probably effective in treating these conditions and many others. More recently, we are beginning to understand, in scientific and psychological terms, the processes through which these beneficial outcomes arise. None of this would be possible without the efforts of many teachers, scholars, researchers, and writers to make mindfulness accessible to the Western community. Adaptations from the original Buddhist teachings may be necessary, and unintended and unrecognized conceptual slippage may be hard to avoid. On balance, however, the benefits seem to outweigh the difficulties.

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