

## Invited commentary

### On measuring mindfulness in psychosomatic and psychological research

The quantification of the construct of mindfulness—as derived from Buddhist psychology—has recently gained prominence (e.g., Refs. [1–6]) as studies of mindfulness-based interventions [7] have become increasingly accepted in psychosomatic medicine and psychology. The article by Carmody et al., [7a] in the current issue, is exemplary of this trend. At least a half dozen self-rating questionnaires have now been published that claim to measure mindfulness [8–13]. The rationale seems to be that if we apply mindfulness-based interventions, we should be able to define, operationalize, and quantify the central object of our intervention. At first glance, this makes perfect sense. However, there are a number of intractable issues that continue to go unconsidered in investigations associated with the psychometric assessment of self-reported “mindfulness.” Failure to recognize these problems may seriously compromise progress in mindfulness research. Furthermore, facile operationalizations of the originally Buddhist psychological construct of mindfulness may serve to trivialize the concept and substantially alter its original meaning.

Some of the critical issues include the following: (1) serious conceptual difficulties and differences, even among experts, in a common understanding of just what mindfulness is; (2) relative naïveté among constructors of inventories in terms of their own limited knowledge of Buddhist thinking and depth of experience with Buddhist meditation practices; (3) neglect of the possibly profound differences among respondents in semantic understanding of scale items, an understanding which seems to be fundamentally dependent on personal mindfulness practice; (4) potentially significant discrepancies between how mindful individuals believe themselves to be (their self-ratings) vs. how mindful they really are, (5) very apparent biases that may apply to long-term practitioners of mindfulness meditation or to those who undergo a mindfulness-based intervention, such as mindful-based stress reduction (MBSR) or mindfulness-based cognitive therapy (MBCT); and (6) consequent problems in validation of the putative “mindfulness” instruments. Each of these points are addressed below:

*Deciding what mindfulness is.* Mindfulness is a difficult concept to define, let alone operationalize [14]. Frequently

quantified psychological characteristics such as sadness, depression, anxiety, nervousness, or various categories of positive emotion each bring their own definitional challenges but are more or less universally familiar affective states or traits. On the other hand, the Buddhist concept of mindfulness, the fundament of mindfulness-based interventions [7,15–17], is a concept that is largely unfamiliar to most people, at least in the West, and is thought to require training to develop by means of extended meditation practice (e.g., Refs. [7,15–17]). Consequently, mindfulness is not to be fully comprehended by discursive, theoretical, or intellectual thinking but primarily relies on practical introspective practices considered undeveloped in most inexperienced individuals (e.g., Refs. [15–17]). It is sometimes described as a state of mind, a trait of mind, a particular type of mental process, or the method for cultivating any or all of the preceding categories. There may be reasonable arguments for each position. Mindfulness, furthermore, is far from a unitary construct, and this has already caused debate and confusion in the psychological literature (e.g., Carmody et al., this issue).

Clearly, there is overlap between different definitions and operationalizations of “mindfulness” to the extent that each characterizes some aspect of attention to experience in the present moment. However, there are also numerous nontrivial differences. For instance, one scale purporting to measure mindfulness includes the reported ability to verbally describe experience (e.g., “I’m good at finding the words to describe my feelings.”) [10]; another emphasizes a particular orientation of curiosity, openness, and acceptance [13]; and still another underlines cultivation of a stable and non-reactive awareness (Carmody et al., this issue). Yet another focuses on an agitated lack of attentiveness to daily life (e.g., “I rush through activities without being really attentive to them,” “I tend to walk quickly without paying attention....,” or “I drive places on ‘automatic pilot’ and then wonder why I went there”) [9], exclusively employing such items in its assessment and then reverse scoring each to evaluate mindfulness as the converse of inattentiveness. Some definitions emphasize intentionality (Carmody et al., this issue). Some consider only mental states [9,12], whereas other also include bodily sensations and experience (e.g., Refs. [8,10]). These are just a few of the prominent differences between underlying definitions and the self-report scales from which they are derived.

The apparent option of merely aiming toward a common denominator of “present-moment awareness of perceptible experience” might, at first consideration, seem feasible. However, this approach would introduce such an erroneous reductionism that it would in no way correspond to the original Buddhist psychological construct of mindfulness, which intimately connects moment-to-moment paying attention to the cultivation of knowledge, positive emotions such as kindness and compassion, and even ethical behavior related to the principle of doing no harm [15–17]. The construct of mindfulness in Buddhist thought cannot operate outside this context. On the other hand, even Buddhist literature and scholars are, themselves, not always in complete agreement about the precise definition of mindfulness (G. Dreyfus and J. Dunne, personal communication).

*Potential biases of inventory developers.* Many of the mindfulness inventories have been developed by researchers with a relatively modest level of personal experience with mindfulness meditation practices or Buddhist psychological theory and often with no clear contributions from traditional mindfulness meditation experts (e.g., Refs. [10–12]; Buchheld et al. [8] being a notable exception). Based on the importance of direct personal experience with Buddhist meditation practices, it would seem implausible that these scientists could come up on their own with an operational definition of mindfulness that authentically reflects the original concept. Additionally, the variations in current operationalizations of the term often seem to correspond more closely to the researcher’s own prior academic interests than to a deep understanding of Buddhist concepts. Thus, Baer and colleagues [10,11], having worked for some time in the area of borderline disorders, apply unique attributes to their “mindfulness” concept (e.g., verbal description) that are based on elements of dialectical behavior therapy (DBT). Their scale seems to reflect quantitative concerns of DBT at the cost of fidelity to original characterizations of mindfulness.

Mindfulness constructs in the behavioral literature, therefore, may be becoming hybrid concepts, only very partially reflecting any original meaning. What further complicates the matter is that individual hybrid concepts underlying measurement differ so much so that different scales *are often uncorrelated with each other or correlated very modestly* (e.g., Carmody, this issue; Refs. [10,18]). Nevertheless, each quantification is referred to as though it uniquely and accurately measures a general construct of “mindfulness” (e.g., Refs. [1–6]).

*Semantic confusion and mindfulness questionnaires.* Because the acquisition of an understanding of mindfulness is predicated on practicing mindfulness meditation, there is a great risk that the words and phrases in inventory items may take on very different meanings dependent on whether one has ever meditated, as well as on the extent of meditation experience. For example, let us examine an item from the Kentucky Inventory of Mindfulness Skills [10], “I notice how foods and drinks affect my thoughts, bodily sensations,

and emotions.” The very act of “noticing” is likely to mean something quite different to a long-term mindfulness meditator as opposed to a college student with no prior exposure to mindfulness practices. A meditator may comprehend the act of “noticing” as an intentional attending to the moment-to-moment experience of drinking or eating in an open, nonjudgmental manner, observing the changing flow of sensations, thoughts, and/or emotional states. The inexperienced college student will almost certainly have a completely different semantic interpretation of the item: She may understand the item to mean something like “I am capable of perceiving how different foods or drinks can create upsetting reactions”; thus, the consequences of eating or drinking something may be seen as unintentional, unpleasant intrusions, of which she believes she is often aware. Alternatively, she may focus her comprehension of the item on her general ability to notice that consuming certain drink (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.

Recent evidence showing how semantic incongruence is dependent on meditation exposure comes from a study using the Freiburg Mindfulness Inventory (FMI) [19]. Binge-drinking and smoking students had significantly *higher* mindfulness scores than a matched control group of students without these behaviors. Interestingly, the FMI “mindfulness” levels of bingeing students were very similar to a group of very experienced mindfulness meditators (from another study [20]) who had just completed intensive multiday mindfulness retreats, and bingeing students scored significantly higher than those meditators before retreat (own calculations)! A major contribution to the higher scores of the bingeing/smoking students was partially attributed to items related to somatic awareness, presumably due to the frequent negative physical consequences of binge drinking or smoking behavior. Nevertheless, this issue of semantic inconsistency is, by no means, limited to items related to bodily awareness or to clinical groups but resides in just how we define such terms as “awareness,” “noticing,” “paying attention,” “judging,” and “present moment.” These common expressions will certainly have relatively specific meanings for meditators within this questionnaire context, which are at significance variance with the meanings attributed to them by most people who have never or rarely practiced mindfulness meditation. Therefore, presence or absence of mindfulness experience is likely to dramatically influence how items in these scales are understood and interpreted.

There are also indications that even among meditators the extent of meditation experience may alter meaning of words or items. Suggestive of this, we found that the factor structure of the FMI changed somewhat, within the same group of highly experienced meditators, from just before to just after retreats of 3 to 10 days [8]. Thus, it may be argued that even relatively short-term, but intensive, mindfulness

practice may alter how items in a “mindfulness” questionnaire are understood.

*Mindfulness and self-ratings of mindfulness: two different things?* Clear objective and observable criteria of mindfulness are unavailable, since no set of behaviors or physiological patterns have yet been documented to be specific to mindfulness (not to mention that, as shown above, core features of “mindfulness” vary from one self-rating scale to another). Given investigators’ unclear characterizations of the concept, how can we ascertain whether there is concordance between how mindful we think we are and/or say we are, and our true level of mindfulness? Typically, questionnaire constructors, when concerned about this issue, have attempted validation of their inventory by comparing samples of meditators and nonmeditators or by examining changes in questionnaire scores before and after mindfulness training, sometimes also with negative results [9]. The example above comparing meditators and bingeing students has already revealed a serious weakness of this strategy.

There are, additionally, a number of clear systematic biases to this approach, including the introduction of the Hawthorne effect, the overconfidence effect, social desirability, and cognitive dissonance. All available mindfulness inventories employ concepts plainly recognizable to those exposed to mindfulness practices as characteristic of the stages or goals of training: they know what the “right answer” is. Having just invested 2 months of one’s life in an intensive MBSR program requiring daily 45-min meditation practice or spent the last 20 years meditating daily, there would seem to be the clear danger of biased responses in the direction of wishing, believing, and/or demonstrating to others that mindfulness qualities have developed. Considering the semantic vulnerability of all scales, the lack of an external referent with which to validate self-report measures of mindfulness and inherent cognitive biases accompanying self-report assessment, it would seem impossible to conclude at this time that self-report scales accurately measure mindfulness.

Another example from the literature suggests the extent of possible discordance between self-report assessments and outcomes based directly on mindfulness training. Stanley et al. [21] examined psychotherapeutic effectiveness in relation to newly trained therapists’ levels of putative “mindfulness,” using the Mindfulness Attention Awareness Scale (MAAS) [8]. They found that self-ratings of “mindfulness” were negatively related to client outcomes: the higher the MAAS scores of psychotherapists, the *poorer* the improvement in client symptom severity at termination of treatment. However, another study [22], addressing much the same question, recently randomized psychotherapists in training either to (a) the normal training program or (b) a prolonged mindfulness training in addition to their normal training program. Client benefits from psychotherapy were then compared between the two groups after completion of therapist training, with a total of about 120 clients. Clients of psychotherapists who had undergone meditation training showed much greater

improvement on a series of standardized measures of well-being in contrast to the other group. It seems reasonable to presume that the disparate attempts at assessing variations in mindfulness led to opposite findings and conclusions.

*Consequent validity concerns of mindfulness inventories.* A number of mindfulness inventories employ college students as the sole or main criterion population for validation of their questionnaires [9–12]. Only a small minority of these students may be expected to have had any meditation experience at all [9–11]. As already illustrated, students inexperienced with mindfulness meditation practice are unlikely to understand scale items in the same way as those with practice experience. Their reports and concept of “mindfulness” will almost certainly be very different from the construct of interest. Given the general unfamiliarity of mindfulness for students, this may be akin to validating a self-rating questionnaire of shame with a sample of sociopaths. Therefore, despite employing numerous methodologically rigorous validation procedures, choosing the wrong population with which to validate an instrument may serve to undermine its overall validity.

Thus, mindfulness inventories may be hampered by serious limitations of construct validity [problems measuring the underlying construct, given (a) differences between questionnaires and (b) variable semantic interpretation of items within each questionnaire], external validity (difficulties generalizing from students to other populations), and criterion validity (the unavailability of a specific and objective external referent with which to compare self-report responses).

*Alternatives to self-report measures of mindfulness?* The foregoing evaluation of self-report measurement of mindfulness suggests serious difficulties for self-assessment of mindfulness using currently available instruments. This is true for both respondents who are unfamiliar with mindfulness practice, as well as those with experience. Nevertheless, there may be alternatives to this questionnaire approach. One possibility may be to pursue qualitative assessment—based on interview data—of differences between mindfulness practitioners and nonpractitioners, or in relationship to parameters of mindfulness training (e.g., extent and type). At this phase of attempts to relate Buddhist psychological constructs to a Western empirical orientation, a qualitative strategy may inform our understanding of mindfulness and its apparently multidimensional nature. Qualitative analysis, for example, may elucidate how cognitive aspects of attention are intrinsically linked to ethical and social behavior in Buddhist thought, a notion rather alien to Western cognitive science.

Still another approach might be to focus on the putative consequences of mindfulness practice, which can be generally characterized as enhancement of well-being of the person undergoing mindfulness training (e.g., Ref. [23]) or of positive effects on others (e.g., Ref. [24]). Closer examination of the outcomes produced by mindfulness practices may shed light not only on what can realistically be

expected in terms of cognitive, affective, or physiological effects, but also on the underlying mechanisms that may contribute to such effects.

However, we proceed, I certainly do not mean to suggest that we give up hope of understanding mindfulness in relation to Western scientific psychological and psychosomatic models. Nevertheless, we need to appreciate that Buddhist and Western approaches to mind and body differ substantially. Haste toward an understanding of mindfulness may limit a genuine opportunity to expand perspectives beyond the familiar. The qualities of careful attention, patience, openness, curiosity, and beginner's mind are often seen as central to the cultivation of mindfulness. Perhaps similar qualities can also serve us in our pursuit to bridge paradigms.

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