Assessment of mindfulness by self-report

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Abstract

Assessment of mindfulness is essential to understanding its relationships with psychological functioning. Currently, mindfulness is most often assessed with self-report questionnaires. Although additional work is required, mindfulness questionnaires have reasonable psychometric properties and are making important contributions to the understanding of mindfulness and its effects on health and wellbeing. For example, measurement of mindfulness as a multidimensional construct shows that present-moment awareness can be unhelpful unless accompanied by a nonjudgmental, nonreactive stance; moreover, nonjudgment and nonreactivity may be only weakly related to present-moment awareness in people with no meditation experience. Differences between psychological and Buddhist conceptions of mindfulness, though often a source of criticism of mindfulness questionnaires, are argued here to be inevitable and not necessarily problematic.

Introduction

Mindfulness entered the field of evidence-based intervention in the 1980s and 90s with the publication of the first empirical studies of mindfulness-based stress reduction (MBSR) [1] and dialectical behavior therapy (DBT) [2]. These papers described the use of mindfulness training to help people suffering from stress, pain, or emotional dysfunction. The mindfulness practices and exercises were adapted from Buddhist meditation traditions, but mindfulness itself appeared to be a psychological capacity related to attention and awareness. Attention had been researched in psychology for many years, but mindfulness was unfamiliar and intriguing. Interest in applying the methods of psychological science to the understanding of mindfulness grew quickly and the publication of papers in peer-reviewed journals continues to accelerate, as shown in Figure 1.

An early task for psychologists was to consider how mindfulness, which has roots in ancient Buddhist teachings, could be defined in contemporary psychological terms. Several definitions have been proposed. Many describe mindfulness as a form of present-moment attention or awareness with two elements: the attention itself and the qualities of the attention. Examples of these two elements, sometimes described as the *what* and the *how* of mindfulness [3], are shown in Table 1 and indicate that mindfulness is generally understood to be open, curious, accepting, friendly, nonjudgmental, compassionate, and kind. Mindfulness has further been conceptualized as a *state* in which these qualities of awareness are present, as a *dispositional or trait-like general tendency* to pay attention in these ways, and as a *set of skills* that develop with training and practice [4,3].

In the context of psychological science, assessment of mindfulness is essential to understanding its relationships with psychological functioning, health, and wellbeing. Assessment of mindfulness currently relies largely on self-report questionnaires. The development of questionnaires requires a comprehensive description of the construct to be measured, based on the relevant literature [5]. Because of its roots in Buddhism, the literature describing mindfulness is unusually broad. Buddhist texts that discuss mindfulness are written in ancient languages, predate science by many centuries, and represent several subtraditions and schools of thought that developed as Buddhism spread across Asia [6]. Most psychologists are not Buddhist scholars and the development of mindfulness questionnaires has therefore been based primarily on descriptions of mindfulness from contemporary sources, such as those in Table 1 and their supporting literature. This has led to criticism of the questionnaires for not adequately capturing Buddhist conceptions. For example, Chiesa [7] stated that "modern attempts to operationalize mindfulness have consistently failed to provide an unequivocal definition of mindfulness which takes into account the complexity of the original definitions" (p. 265). Critics have also questioned the psychometric properties of the available questionnaires and highlighted the need for more objective measures [8].

The remainder of this review makes two general arguments about measurement of mindfulness by self-report. First, differences between Buddhist and psychological conceptions of mindfulness are inevitable, not necessarily problematic, and sometimes useful for scientific or clinical purposes. Defining mindfulness as a psychological capacity and conceptualizing it in psychological terms makes it amenable to self-report, the most commonly used, efficient, and convenient form of assessment. Despite their well-known limitations, questionnaires can

provide reliable, valid, and useful information when they are well constructed for their intended populations. Second, the most commonly used mindfulness questionnaires have reasonable psychometric properties and are making important contributions to the understanding of mindfulness. Some of this understanding has emerged through the exploration of anomalous findings, which occur in all fields of study and can lead to important insights.

The many definitions of mindfulness

Buddhist scholars note that the ancient texts describe mindfulness in a variety of ways. According to Dreyfus [9], "Buddhism is a plural tradition that has evolved over centuries to include a large variety of views about mindfulness. Hence, there is no single view that can ever hope to qualify as 'the Buddhist view of mindfulness'" (p. 42). Gethin [10] notes that finding a "succinct definition of mindfulness in the texts of early Buddhism is not so easy. Such definitions as there are are rather different in character" (p. 269). Nevertheless, Grossman & Van Dam [11] suggest that among Buddhist scholars there is a "common basis of understanding" (p. 221), although interpretations and descriptions of mindfulness vary in their emphasis on particular aspects.

Parallels can be seen with psychological definitions of mindfulness. The term is used in several evidence-based programs, each with its own conceptualization of mindfulness and how it should help with particular problems. The developers of questionnaires have relied on different segments of these and other literatures and have emphasized different aspects of mindfulness. Even so, the descriptions in Table 1 suggest that most are consistent with the general framework of *what* and *how* [12]. It appears that Buddhist and psychological

conceptions of mindfulness may be distinct but overlapping categories, with each category containing both variety and consistency. Popular conceptions in the media and the general public, some of which are misconceptions [8], may be a third category, as shown in Figure 2. The degree of overlap is unclear, but may be higher for the Buddhist and psychological conceptions than for the popular ones.

Why contemporary psychological conceptions differ from Buddhist roots

The need to make mindfulness acceptable to non-Buddhist participants in mainstream Western settings has been recognized since the introduction of mindfulness-based interventions (MBIs). According to Kabat-Zinn [13], an intention behind MBSR was to recontextualize understanding of mindfulness within the frameworks of science, medicine, and healthcare "so that it would be maximally useful to people who could not hear it or enter into it through the more traditional dharma gates" (p. 288). Similarly, Linehan [14] notes that the mindfulness skills in DBT are "psychological and behavioral translations of meditation practices from Eastern spiritual training" and are "purposely provided in a secular format" (p. 151). Linehan also notes that people with severe emotional disturbance may be unable to practice formal meditation, and so DBT includes many nonmeditative behavioral exercises designed to cultivate mindfulness.

Defining mindfulness as a measurable psychological construct also introduces inconsistencies with Buddhist conceptions. Current methods of construct validation emphasize measuring each facet of a multifaceted construct with a unidimensional subscale [15]. Thus, if mindfulness is understood to include present-moment attention, nonjudging, and nonreactivity, each of these elements should be assessed separately. Relationships among the

facets and other variables can then be studied and facet scores can be aggregated to represent the broader construct. This approach has contributed greatly to understanding the nature of mindfulness and its relationships to psychological functioning, but it has done so from a psychological science perspective. From a Buddhist perspective, concerns have been expressed about separating mindfulness into discrete components and about separating it from other factors with which it is interwoven [11]; these include wisdom, ethical behavior, and the four "immeasurables" (compassion, loving kindness, sympathetic joy, equanimity).

Psychometric properties of mindfulness questionnaires

The most commonly used mindfulness questionnaires are the Mindful Attention Awareness Scale (MAAS) [4], the Five Facet Mindfulness Questionnaire (FFMQ) [16], the Kentucky Inventory of Mindfulness Skills (KIMS) [17], the Freiburg Mindfulness Inventory (FMI) [18], and the Cognitive Affective Mindfulness Scale-Revised (CAMS-R) [19]. All were designed to assess the general tendency to be mindful in daily life. Their psychometric properties have been widely studied. Internal consistency is typically strong [20]. Test-retest reliability is generally adequate to good [21,22]. Factor structure is strong for the MAAS [21] and CAMS-R [19]; for the KIMS and FFMQ, factor structure differs for meditators and nonmeditators but is generally consistent within these groups [23]. Correlations between mindfulness questionnaires are significant but variable [16], probably because of differences in the elements of mindfulness they emphasize. Construct validity through hypothesis testing (e.g., whether mindfulness scores correlate in predicted ways with other measures and differ as expected between groups) is strong for the MAAS, KIMS, CAMS-R, and FFMQ and mixed for the FMI [20].

Meta-analyses have concluded that scores on mindfulness questionnaires increase in response to mindfulness training [24,25,26] and that therapeutic effects of MBIs appear to be mediated by increases in self-reported mindfulness skills [27]. Two recent meta-analyses have shown moderate support for discriminant validity in the context of change with treatment; i.e., that scores on mindfulness questionnaires increase more in mindfulness-based programs than in other programs [28] (Baer et al., unpublished).

Additional work is needed on how best to define and capture the essential what and how elements of mindfulness. Findings also show that programs including no explicit mindfulness training often lead to increases in mindfulness scores, perhaps because they cultivate related skills such as awareness of thoughts and feelings and willingness to experience them. Additional research is needed to clarify the conditions that lead to acquisition of mindfulness skills. Finally, the incremental validity of mindfulness measures over neuroticism and negative affectivity needs more comprehensive study. Vujanovic et al. [29] reported incremental validity of some KIMS scales over negative affectivity in predicting emotion dysregulation. A meta-analytic review of 18 correlational studies [30] found a mean correlation between mindfulness and neuroticism of .45, suggesting that they are related but distinct. However, incremental validity was not examined.

Learning from unexpected findings

Although mindfulness questionnaires have performed reasonably well on a variety of psychometric tests, anomalous findings are occasionally reported. For example, Leigh, Bowen, & Marlatt [31] found that binge drinkers scored higher than nondrinkers on the FMI, apparently due to higher levels of bodily awareness. Subsequent studies using the FFMQ, which provides

separate scores for present-moment awareness, nonjudging, and nonreactivity, have shown that the effects of present-moment awareness are moderated by its qualities. That is, several clinically relevant variables, including substance use, depression, rumination, worry, and blood pressure, have been shown to be lower in participants who endorse high levels of present-moment awareness, but only if the awareness is nonjudgmental or nonreactive [32,33,34]. These findings are consistent with earlier research on self-focused attention, a construct that was widely studied before mindfulness appeared in the literature. Self-focused attention, defined as awareness of thoughts, emotions, and sensations, is adaptive when it is nonjudgmental and experiential but maladaptive when it is judgmental and ruminative [35,36,37].

Thus, further exploration of unexpected results from a mindfulness questionnaire led to a clear understanding that the same pattern seen in the self-focused attention literature applies to self-awareness as understood in the mindfulness field. That is, present-moment awareness of thoughts and feelings can be unhelpful unless it is accompanied by a nonjudgmental, nonreactive stance. This finding highlights the importance of unidimensional subscales, without which such moderation effects cannot be studied.

The moderation effects among mindfulness facets also help to explain another anomalous finding: that the factor structure of the FFMQ differs between meditators and nonmeditators. In meditators, all five facets are elements of an overarching mindfulness construct, whereas in nonmeditators, the *observing* subscale, which assesses awareness of internal and external stimuli, is not part of this construct. From a psychometric perspective, this is a clear limitation and suggests that a total score on the FFMQ has questionable validity in

nonmeditating samples (although a total score that omits the observing scale can be useful). Conceptually, however, the pattern is instructive. It shows that present-moment awareness can be consistent with mindfulness (nonjudgmental, nonreactive) or inconsistent with mindfulness (judgmental, reactive), and that in the absence of mindfulness training, the latter is more common [16,38,23].

Beyond self-report

An objective behavioral task that measures mindfulness could supplement the findings of self-report methods and would be a helpful addition to the literature. A recently proposed breath counting task [39] assesses the ability to maintain focus on the breath (a common meditative practice) and has shown higher scores in meditators than nonmeditators and improvement with training. However, it does not assess the nonjudgmental, nonreactive stance to present-moment experiences that previous work suggests is essential. A similar task described by Frewen et al. [40] asks participants to focus on the breath for a 15-minute period in which a bell sounds at irregular intervals. Participants note at each bell whether their attention was on the breath or wandering. Scores have been shown to improve with practice and to be weakly correlated with self-reported mindfulness. However, the authors describe this task as a measure of focused attention during meditation, rather than a measure of mindfulness, because it does not assess qualities of awareness such as acceptance, openness, and curiosity.

Conclusions

Questionnaires have well known limitations and mindfulness questionnaires present particular difficulties [41]. Attempts to work with these difficulties have been reasonably

successful from a psychometric perspective and the questionnaires have made strong contributions to understanding mindfulness as it is conceptualized in psychological science. It is unlikely that the questionnaires capture the complexities of Buddhist understandings of mindfulness, but this may not be entirely problematic. The goal of much contemporary research is to measure mindfulness in the adapted forms taught in evidence-based MBIs or to study the dispositional tendency for nonjudgmental awareness in ordinary daily life in non-Buddhist populations. For such purposes, "degree of fidelity to historical definitions may not necessarily matter to definitions of mindfulness applied in modern practice" [8].

On the other hand, in the Buddhist teachings mindfulness is embedded in a context that includes compassion, kindness, joy, equanimity, wisdom, ethical behavior, and more. From a psychological science perspective, each of these is probably a measurable multidimensional construct. The application of psychological science methods to the conceptualization and assessment of these phenomena could greatly enrich psychological understanding. Self-report instruments are already available for some of these variables (e.g., compassion, equanimity) and are likely to make important contributions to an expanded understanding of mindfulness.

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Figure 1.

Journal publications about mindfulness per year since 1980

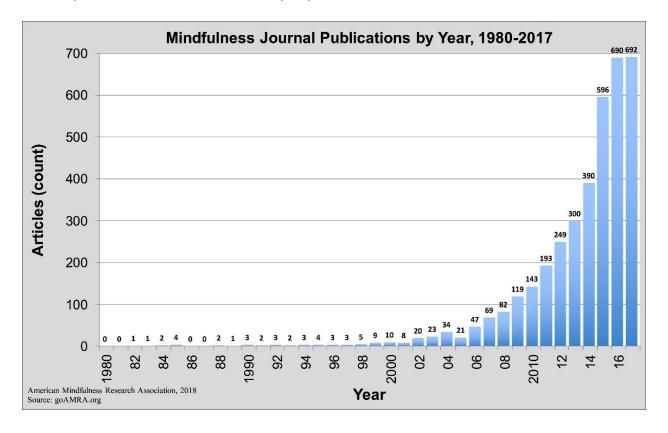


Figure 2.

Categories of conceptions of mindfulness. Degrees of overlap are unclear and depicted arbitrarily.

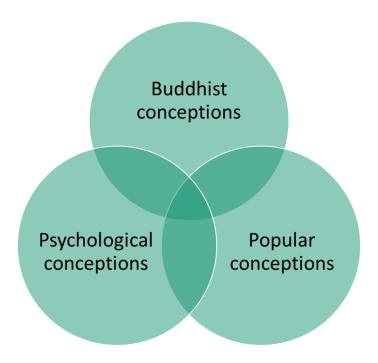


Table 1.

Contemporary psychological descriptions of mindfulness: what and how

Author(s)	What	How
Kabat-Zinn [4,5]	Paying attention, or the	on purpose, in the present
	awareness that arises through	moment, and nonjudgmentally;
	paying attention	with an affectionate,
		compassionate quality, a sense
		of openhearted friendly
		presence and interest
Marlatt & Kristeller	Bringing one's complete	on a moment-to-moment basis,
[6]	attention to present	with an attitude of acceptance
	experiences	and loving kindness
Bishop et al [7]	Self-regulation of attention so	with an orientation
	that it is maintained on	characterized by curiosity,
	immediate experience	openness, and acceptance
Germer et al [8]	Awareness of present	with acceptance: an extension
	experience	of nonjudgment that adds a
		measure of kindness or
		friendliness
Linehan [9]	The act of focusing the mind in	without judgment or
	the present moment	attachment, with openness to
		the fluidity of each moment