Providing compassionate care to others is often challenging, and it is not uncommon for nurses to require greater personal resources, techniques, and strategies to deliver the care that patients both want and need. Mindfulness programs like Sankalpa enable nurses to care in a way that engages patients and their families. Through the development of mindfulness, compassion, and self-compassion, nurses are able to meaningfully connect with patients and be good company on their journey.

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Which Mindfulness Measures To Choose To Use?

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Hyland, Lee, and Mills (2015) specified the two most popular scales for mindfulness: the Freiburg Mindfulness Inventory (FMI; 30 items,

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Buchheld, Grossman, & Walach, 2001; 14 items, Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006) and the Mindfulness Attention and Awareness Scale (MAAS; Brown & Ryan, 2003). However, the popularity of these measures does not necessarily mean that they are of high quality. Especially considering the complex epistemology and ontology of the mindfulness construct, we should apply mindfulness assessments with caution. More specially, according to item development theorists in the industrial and organizational (I-O) area (see Hinkin, 1998; Hinkin & Tracey, 1999; Kerlinger & Lee, 2000; Schriesheim, Powers, Scandura, Gardiner, & Lankau, 1993), scholars must select measures that have (a) a clear operational definition; (b) alignment between definition and measure (content validity); (c) high reliability and (d) high construct validity; and (e) high criterion-related validity. However, it is not clear which of the available mindfulness assessments satisfies these criteria and to what extent. In this commentary, we assess currently used measures based on these criteria and provide directions for future research.

There have been 11 mindfulness measures published to date, 3 of which we excluded here because of their infrequent use (citations in Google Scholar less than 30), including the Development Mindfulness Survey (Solloway & Fisher, 2007), the Effects of Meditation Scale (Reavley & Pallant, 2009), and the Langer Mindfulness/Mindlessness Scale (Haigh, Moore, Kashdan, & Fresco, 2011). Hence in this commentary, we focus on the eight measures presented in Table 1: MAAS, FMI (14 items),[1] the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004), the Toronto Mindfulness Scale (TMS; Lau et al., 2006), the Five Facets Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), the revised Cognitive and Affective Mindfulness Scale (CAMS; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007), the Southampton Mindfulness Questionnaire (SMQ; Chadwick et al., 2008), and the Philadelphia Mindfulness Scale (PHLMS; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008). We first elaborate on our specified standards, then apply these standards to assess established mindfulness measures, and finally provide our evaluation results. Table 2 summarizes the results of our assessment.

1. Clear Operational Definition

Without operational definitions, it is not possible for scholars to develop measures for empirical studies (Hinkin, 1998; Schwab, 1980). A good operational definition of mindfulness should be able to reflect the complex mindful state and efficiently direct instrument development (Chiesa, 2013). As

1 We choose to comment on FMI (14 items) rather than FMI (30 items), because FMI (30 items) was designed for participants with meditation experience only.

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Table 1. Mindfulness Measures

Name of measure	Google Scholar citations (as of June 7, 2015)	Trait or state	Number of items	Dimensions
The Mindfulness Attention and Awareness Scale (MAAS; Brown & Ryan, 2003)	Cited by 3,545	Both trait and state	15 for trait; 5 for state	Only one dimension
The Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004)	Cited by 1,085	Trait	39	1. observe items (12 items) 2. describe items (8 items) 3. act with awareness items (10 items) 4. accept without judgment items (9 items)
The Freiburg Mindfulness Inventory (FMI; Walach et al., 2006)	Cited by 410	Trait	14	Only one dimension
The Toronto Mindfulness Scale (TMS; Lau et al., 2006)	Cited by 477	State	13	1. curiosity (6 items) 2. decentering (7 items)
The Five Facets Mindfulness Questionnaire (FFMQ; Baer et al., 2006)	Cited by 1,835	Trait	39	1. nonreactivity to inner experience (7 items) 2. observing (8 items) 3. acting with awareness (8 items) 4. describing (8 items) 5. nonjudging of experience (8 items)
The revised Cognitive and Affective Mindfulness Scale (CAMS; Feldman et al., 2007)	Cited by 344	Trait	12	1. attention (3 items) 2. present focus (3 items) 3. awareness (3 items) 4. acceptance(3 items)
The Philadelphia Mindfulness Scale (PHLMS; Cardaciotto et al., 2008)	Cited by 280	Trait	20	1. awareness (10 items) 2. acceptance (10 items)
The Southampton Mindfulness Questionnaire (SMQ; Chadwick et al., 2008)	Cited by 203	Trait	16	Only one dimension (The measure was defined to have four dimensions)

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Table 2. Evaluation of Mindfulness Measures

Measure	Operational definitions	Content validity	Reliability	Discriminant validity	Convergent validity	Concurrent validity	Predictive validity
MAAS Brown and Ryan (2003)	Provide a definition "the state of being attentive to and aware of what is taking place in the present" (p. 822); offer explanations of the inclusion and exclusion criteria	Consistent dimensions as indicated by theory; inductive and deductive method for item generation; use EFA and CFA	Cronbach's alpha ≥ .80	Different from other similar constructs such as need for cognition and absorption	Convergent with mindfulness/ mindlessness scale	Use correlation and regression analyses; well-being, autonomy, and affect as outcomes	Use correlation analyses; use regression to analyze relationships between change scores; well-being as an outcome
Evaluation	High	High	High	High	High	High	High
KIMS Baer et al. (2004)	Provide definitions of four dimensions based on previous literature: observing, describing, acting with awareness, and accepting without judgment; fail to offer inclusion and exclusion criteria	Consistent dimensions as indicated by theory; deductive method for item generation; use EFA and CFA	Cronbach's alpha ≥ .76 (reliability of each dimension)	Different from other similar constructs such as neuroticism and general distress	One out of the four dimensions does not convergent with MAAS measure	None	None

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Table 2. Continued

Measure	Operational definitions	Content validity	Reliability	Discriminant validity	Convergent validity	Concurrent validity	Predictive validity
Evaluation	Moderate	High	High	High	High	*None*	*None*
FMI Walach et al. (2006)	Cite the multidimensional definition of Bishop et al. (2004), but do not clarify whether this is the operationalized definition	Inconsistent dimensions as indicated by theory; deductive and inductive method without referring to specific definitions; only use EFA for item reduction	Cronbach's alpha ≥ .86	Different from other similar constructs including self-awareness	None	None	None
Evaluation	Moderate	Low	High	High	*None*	*None*	*None*
TMS Lau et al. (2006)	Adopt the two-dimensional definition proposed by Bishop et al. (2004); explain the inclusion and exclusion criteria	Inconsistent dimensions as indicated by theory; deductive method for item generation; used EFA and CFA; however, EFA results in different factors as indicated by the definition, and CFA is based on the results of EFA	Cronbach's alpha ≥ .86 (reliability of each dimension)	Different from other similar constructs such as absorption and internal state awareness	None	None	Use regression to analyze relationships between changes in mindfulness and outcome variables; subjective stress and psychopathology as outcomes

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Table 2. Continued

Measure	Operational definitions	Content validity	Reliability	Discriminant validity	Convergent validity	Concurrent validity	Predictive validity
Evaluation	High	Low	High	High	*None*	*None*	Moderate
FFMQ Baer et al. (2006)	None	None	Cronbach's alpha ≥ .67 (reliability of each dimension)	Different from other similar constructs such as self-compassion	Convergent with MAAS, FMI, KIMS, CAMS, and SMQ	Use regression analyses; psychological symptoms and well-being outcomes	None
Evaluation	*None*	*None*	High	High	High	High	*None*
CAMS Feldman et al. (2007)	State four dimensions deriving from the definitions of Bishop et al. (2004) and Kabat-Zinn (2003), but do not give definitions for specific dimensions; refer to previous definitions as inclusion criteria	Consistent dimensions as indicated by theory; deductive method; only use CFA for item reduction	Cronbach's alpha ≥ .42 (reliability of each dimension)	Different from other similar constructs such as over-engagement	Convergent with MAAS and FMI	None	None
Evaluation	Moderate	High	Low	High	High	*None*	*None*

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Table 2. Continued

Measure	Operational definitions	Content validity	Reliability	Discriminant validity	Convergent validity	Concurrent validity	Predictive validity
SMQ Chadwick et al. (2008)	Provide definitions for four dimensions; fail to offer inclusion and exclusion criteria	Inconsistent dimensions as indicated by theory; present the SMQ 16 items without describing item development process or offering references	Cronbach's alpha ≥ .82 (reliability of all items together)	None	Convergent with the MAAS measure	Use correlation analyses; individual affect and psychotic symptoms as outcomes	None
Evaluation	Moderate	Low	—[a]	*None*	High	Moderate	*None*
PHLMS Cardaciotto et al. (2008)	Provide definitions for two dimensions; offer explanations of the inclusion and exclusion criteria; specify the relationship between two dimensions	Consistent dimensions as indicated by theory; deductive method; use EFA and CFA	Cronbach's alpha ≥ .75 (reliability of each dimension)	Different from other similar constructs such as social desirability and depression	Convergent with MAAS and KIMS	None	None
Evaluation	High	High	High	High	High	*None*	*None*

Note. EFA = exploratory factor analyses; CFA = confirmatory factor analyses.
[a]Chadwick et al. (2008) did not provide reliability of each dimension, and thus we could not evaluate their reliability level.

we have learned from definitions of other constructs (e.g., transformational leadership, Van Knippenberg & Sitkin, 2013), a good definition should (a) state clear definitions for the construct and each dimension (if multidimensional), (b) articulate relationships among distinct dimensions, and (c) specify inclusion and exclusion criteria for the definitions.

A Clear Definition for Mindfulness and Each Dimension

Despite some overlaps, different terminology has been used to define the construct of mindfulness (Dimidjian & Linehan, 2003), and there have been incongruent arguments regarding the dimensions. Whereas Brown and Ryan (2003) referred to mindfulness as a one-dimensional construct, Bishop et al. (2004) described mindfulness as a two-dimensional construct, comprising self-regulation of attention and orientation to experience. Other scholars promote even more dimensions, such as Baer et al. (2006), who include observing, describing, acting with awareness, nonreactivity to inner experience, and nonjudging of inner experience. We do not advocate any particular number of dimensions but rather call for them to be clearly stated in an operational sense, so they may be used to guide empirical research. By illustration, Brown and Ryan (2003; MAAS) referred to mindfulness as a one-dimensional construct and clearly defined it as "the state of being attentive to and aware of what is taking place in the present" (p. 822). Cardaciotto et al. (2008; PHLMS) also provided clear definitions for mindfulness and both of their proposed dimensions: present-moment awareness and acceptance. As such, we rate both MAAS and PHLMS as high on this criterion (see Table 2). Baer et al. (2006; FFMQ), however, failed to provide operational definitions for each dimension prior to developing their instrument.

Articulation of the Relationships Among Distinct Dimensions

As demonstrated by Chiesa (2013), definitions for distinct components are not enough for a clear operational definition, because scholars might not be able to capture the synergistic or mutually reinforcing interrelationships among distinct components. As such, consistent with what we have learned from the transformational leadership construct (Van Knippenberg & Sitkin, 2013), articulating the relationships among components becomes essential. For all six multidimensional measures we examined, only Cardaciotto et al. (2008; PHLMS) specified the relationship that is proposed to exist between the two dimensions of mindfulness. Therefore, we encourage further research into the relationships between the mindfulness dimensions.

Criteria for Inclusion and Exclusion of Mindfulness Definition

Following the suggestions of Van Knippenberg and Sitkin (2013), clear inclusion and exclusion criteria are essential for researchers to clarify a boundary

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for a construct in general and its components in particular. With that said, mindfulness scholars should specify why they choose particular dimensions instead of others. More important, this boundary should allow researchers to separate the mindfulness construct from closely related constructs, such as emotional intelligence.

Most scholars used previous definitions for their inclusion criteria. For example, Feldman et al. (2007) specified four dimensions: attention, present focus, awareness, and acceptance for the CAMS measure, based on previously published definitions. Exclusion of other dimensions, on the other hand, was mostly based on the rule that any new dimension cannot be inferred from or implied by established dimensions. For example, Brown and Ryan (2003) argued that acceptance should not be added as a unique dimension because it is so closely tied to awareness, and separately it offered no additional explanatory power. Cardaciotto et al. (2008), however, argued that the degree to which there was mutual influence between awareness and acceptance was an open question; hence, acceptance should be incorporated as another dimension. We consider both studies to have done a good job in drawing on theoretical evidence to justify their inclusion and exclusion decisions. Other studies lacked these necessary justifications; for example, Baer et al. (2004; KIMS) and Baer et al. (2006; FFMQ) failed to adequately provide inclusion and exclusion criteria.

2. Alignment Between Definition and Measure (Content Validity)

Content validation is critical in connecting definitions with corresponding measures (Kerlinger & Lee, 2000). Schriesheim et al. (1993) argued that high content validity should be guaranteed in the first place for item development procedures, because otherwise scholars might end up producing consistent measures (reliable) that describe a totally different construct from that which was intended to be measured (low content validity). A disconnect between mindfulness and the items used to measure it could explain inconsistent or unexpected findings in relation to the nomological network of mindfulness.

We evaluate the quality of content validity based on standards specified by Hinkin (1998), Hinkin and Tracey (1999), and Schriesheim et al. (1993). To develop measures with high content validity, scholars use either a deductive approach or a combination of inductive and deductive approaches to generate items, ask experts to evaluate item descriptions according to operational definitions, conduct exploratory factor analyses (EFAs), and accordingly revise their items. Then confirmatory factor analyses (CFAs) using a new sample are recommended to make sure that the new measure fits the theoretical definitions.

Among the eight measures for mindfulness we evaluate here, only MAAS and PHLMS followed the above procedures and produced new items

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with high content validity. FMI, SMQ, and FFMQ, however, ignored previous definitions (if any), and items were proposed without effective references to definitions. Although TMS intended to follow the operational definition of Bishop et al. (2004), it ended up being mostly data driven: The dimensions were altered based on the EFA results. On the contrary, realizing the danger of being guided by EFA results, Feldman et al. (2007) made the opposite mistake by choosing not to use EFA to revise items in their CAMS instrument, and therefore their items ended up having low factor loadings.

3. Reliability

Reliability refers to the precision or accuracy of a measure, and it is a necessary (but not sufficient) condition for construct validity (Hinkin, 1998). Hence, reliability is essential to ensure high measurement quality (Kerlinger & Lee, 2000). Nunnally (1978) noted that a measure with reliability higher than .70 was acceptable. According to our summary, all measures of mindfulness, except for the CAMS (low reliability) and the SMQ (reliability of each dimension was missing), held reliability (Cronbach's alpha) of each dimension higher than .72 (the nonreactivity to inner experience dimension of the FFMQ in a student sample is an exception; it had a reliability of 0.67). We therefore consider this criterion to be the strongest across the board in our evaluation of published mindfulness measures.

4. Construct Validity

High construct validity is important in guaranteeing the correspondence between the latent constructs and the specific measures (Kerlinger & Lee, 2000). With high construct validity, we are more confident that our measures have high overlap with alternative measures and are distinguished from measures of different constructs. That is, construct validity includes convergent validity (e.g., high correlations between measures of similar constructs) and discriminant validity (e.g., low correlations between measures of dissimilar constructs; Campbell & Fiske, 1959).

Five (MAAS, KIMS, FFMQ, CAMS, and PHLMS) out of eight mindfulness measures met the standards specified above. FMI and TMS failed to conduct convergent validity tests. SMQ, on the other hand, did not specify its discriminant validity. Overall, construct validity was not highly problematic for most of the mindfulness scales.

5. Criterion-Related Validity

By putting the focal construct in a nomological network and calculating the correlations or incremental relationships between the measure of the focal construct and the measures of other constructs, scholars are able to infer whether the measure accurately reflects the focal construct (Cronbach &

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Meehl, 1955). Criterion-related validity is designed to fulfill this purpose. According to Kerlinger and Lee (2000), criterion-related validity incorporates concurrent validity (e.g., relationships between mindfulness and related outcome variables measured at the same time) and predictive validity (e.g., relationships between mindfulness and related outcome variables measured sequentially).

Among all measures, MAAS demonstrated expected relationships with related outcome variables, including well-being, both for concurrent validity and predictive validity. FMI, KIMS, CAMS, and PHLMS, however, failed to conduct concurrent validity and predictive validity analyses, and thus from those scale development articles, we were not able to detect their quality of concurrent validity or predictive validity. Although TMS developers did not conduct concurrent validity analyses, they conducted mindfulness interventions and found support for expected relationships between this measure and outcome variables, including subjective stress and psychopathology.

FFMQ and SMQ, on the other hand, only employed concurrent validity tests for examining its nomological network. Specifically, FFMQ did a better job than the SMQ, in that the regression analyses enabled Baer et al. (2004) to conclude incremental relationships while controlling other variables, but correlation analyses as adopted by Chadwick et al. (2008) could not achieve this function. In sum, establishing concurrent and predictive validity (or a clear discussion of these procedures) was missing for all measures, except for the MAAS, which established both types of validity.

So Which Measures To Select?

Using the five general standards specified above, we evaluated the eight most common mindfulness measures. We summarized our evaluation reasons and results in Table 2. More specifically, for each standard, when measures achieved at least two third of our criteria, we rated them as high; if measures met less than a third of all criteria we specified, we assessed them as low; for those measures in between, we labeled them as moderate.

Considering the missing evidence for criterion-related validity, we first evaluated all measures together based on the first four standards and found that MAAS showed the highest quality, with PHLMS showing the second highest, and KIMS showing the third. We do not recommend the other five measures because they hold low quality in at least one standard. Specifically, the low quality on operational definitions and content validity criteria is difficult to remedy, because these standards must be met before choosing the final version of the measurement instrument. As such, we are reluctant to suggest KIMS, considering that its operational definition neither failed to clarify inclusion and exclusion criteria nor specified the relationships among distinct components.

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MAAS demonstrates a clear operational definition, has evidence of high reliability and validity, and thus is a highly recommended measure to use. Although original development of PHLMS did not satisfy the fifth criterion, we conducted further examination of this measure. To assess concurrent validity and predictive validity for PHLMS, we sought other articles that described the nomological network for mindfulness using PHLMS. We found that PHLMS demonstrated high concurrent validity in Ruocco and Direkoglu (2013) and moderate predictive power in Butryn et al. (2013). Therefore, we recommend scholars apply either MAAS or PHLMS in their studies.

Conclusions

Incongruous mindfulness definitions and measures indicate the ambiguity and inaccuracy of established mindfulness research and, more important, require scholars to wisely select measures. Given the plentitude of mindfulness measures and the epistemological and ontological complexity of the construct, we scrutinized and rated eight widely used mindfulness measures, guided by standards specified by item development theorists in the I-O area. Most common problems were related to the lack of a clear mindfulness definition that establishes dimensions and relationships between dimensions, as well as missing criterion-related validity assessment. Our evaluations specified MAAS and PHLMS as the two most desirable (valid and reliable) measures currently available. We urge scholars to cautiously select mindfulness measures. We also encourage scholars to move the field forward by establishing a common and clear operational definition.

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