

Assessment of Mindfulness by Self-Report: The Kentucky Inventory of Mindfulness Skills

Ruth A. Baer, Gregory T. Smith and Kristin B. Allen

Assessment 2004 11: 191

DOI: 10.1177/1073191104268029

The online version of this article can be found at:

<http://asm.sagepub.com/content/11/3/191>

Published by:



<http://www.sagepublications.com>

Additional services and information for *Assessment* can be found at:

Email Alerts: <http://asm.sagepub.com/cgi/alerts>

Subscriptions: <http://asm.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

Citations: <http://asm.sagepub.com/content/11/3/191.refs.html>

>> [Version of Record](#) - Jul 29, 2004

[What is This?](#)

Assessment of Mindfulness by Self-Report

The Kentucky Inventory of Mindfulness Skills

Ruth A. Baer

Gregory T. Smith

University of Kentucky

Kristin B. Allen

Comprehensive Care Center, Lexington, Kentucky

A self-report inventory for the assessment of mindfulness skills was developed, and its psychometric characteristics and relationships with other constructs were examined. Participants included three samples of undergraduate students and a sample of outpatients with borderline personality disorder. Based on discussions of mindfulness in the current literature, four mindfulness skills were specified: observing, describing, acting with awareness, and accepting without judgment. Scales designed to measure each skill were developed and evaluated. Results showed good internal consistency and test-retest reliability and a clear factor structure. Most expected relationships with other constructs were significant. Findings suggest that mindfulness skills are differentially related to aspects of personality and mental health, including neuroticism, psychological symptoms, emotional intelligence, alexithymia, experiential avoidance, dissociation, and absorption.

Keywords: mindfulness; self-report assessment; inventory development; psychometric characteristics

Mindfulness is a way of directing attention that originates in Eastern meditation traditions but is increasingly discussed and practiced in Western culture (Kabat-Zinn, 2000). It is generally defined to include focusing one's attention in a nonjudgmental or accepting way on the experience occurring in the present moment (Kabat-Zinn, 1994; Linehan, 1993b; Marlatt & Kristeller, 1999). It can be contrasted with states of mind in which attention is focused elsewhere, including preoccupation with memories, fantasies, plans, or worries, and behaving automatically without awareness of one's actions (Brown & Ryan, 2003). Kabat-Zinn (2003) and Brown and Ryan (2003) note that whereas most people probably are capable of mindfulness, individuals may vary over time and are likely to differ from one another in their tendency to be mindful.

The cultivation of mindfulness through the practice of meditation has a long history in Eastern spiritual traditions, primarily Buddhism (Linehan, 1993a; Kabat-Zinn,

1982). These traditions suggest that regular practice of mindfulness meditation reduces suffering and develops positive qualities, such as awareness, insight, wisdom, compassion, and equanimity (Goldstein, 2002; Kabat-Zinn, 2000). In recent decades, health professionals and researchers have suggested that the cultivation of mindfulness may be beneficial to Westerners who are unwilling to adopt Buddhist terminology or traditions. Thus, mindfulness practices are sometimes conceptualized as sets of skills that can be taught independently of their spiritual origins (Kabat-Zinn, 1982) and sometimes independently of traditional meditation (Dimidjian & Linehan, 2003a; Hayes & Shenk, in press). These skills have been incorporated into several interventions that are now widely available in medical and mental health settings, including mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982, 1990), mindfulness-based cognitive therapy (MBCT; Segal, Williams, & Teasdale, 2002), dialectical

We thank Dr. Tom Widiger for helpful comments on an earlier draft.

Assessment, Volume 11, No. 3, September 2004 191-206

DOI: 10.1177/1073191104268029

© 2004 Sage Publications

behavior therapy (DBT; Linehan, 1993a, 1993b), acceptance and commitment therapy (ACT; Hayes, Strosahl, & Wilson, 1999), and relapse prevention for substance abuse (Marlatt & Gordon, 1985; Parks, Anderson, & Marlatt, 2001).

Although these interventions vary in their approach to teaching mindfulness skills, several general instructions are common to most mindfulness exercises. Often, participants are asked to focus their attention on an ordinary activity, such as breathing, walking, or eating, and to observe it carefully. They are invited to notice that their attention may wander into thoughts, memories, or fantasies. When this happens, they note briefly that the mind has wandered and then resume attending to the target of observation. If bodily sensations or emotions arise, participants observe them carefully. Urges or desires to engage in behaviors, such as shifting the body's position or scratching an itch, also are observed but are not necessarily acted on. Brief, covert labeling of observed experience, using words or short phrases, such as "aching," "sadness," or "wanting to move" is often encouraged (Linehan, 1993b, Segal et al., 2002). Some exercises encourage observation of environmental stimuli, such as sounds or sights. Participants are encouraged to bring an attitude of friendly curiosity, interest, and acceptance to all observed phenomena while refraining from evaluation, self-criticism, or attempts to eliminate or change the phenomena they observe (Segal et al., 2002). For example, no attempt is made to evaluate thoughts as rational or distorted, to change thoughts judged to be irrational, or to reduce unpleasant emotions. Rather, cognitions and emotions are simply noted and observed as they come and go. Mindfulness skills can be developed through formal meditation exercises in which participants sit quietly while directing their attention in specific ways or through other exercises in which participants mindfully engage in routine activities such as bathing, walking, or eating.

The empirical literature provides strong support for the efficacy of mindfulness training (Baer, 2003). Reductions in many medical and psychological symptoms have been reported. Several authors have discussed mechanisms that may explain the changes produced by these interventions. For example, mindfulness practice may function as an exposure procedure in which sustained observation of aversive thoughts and feelings leads to reduced emotional reactivity to these stimuli and reduced escape and avoidance behaviors (Kabat-Zinn, 1982; Linehan, 1993a, 1993b). Mindfulness practice also may encourage a new perspective on internal experience, often described as metacognitive insight (Teasdale, 1999) or decentering (Segal et al., 2002). This perspective suggests that thoughts are "just thoughts," are numerous and transient, and do not necessitate specific behaviors. Mindfulness

practice also may result in improved self-observation skills, which may lead to better recognition of sensations, cognitions, and emotional states and improved ability to respond skillfully to these phenomena as they arise.

Although the literature on mindfulness-based interventions is growing rapidly, the assessment of mindfulness has received much less attention. Most studies report that symptoms have been reduced but do not measure whether participants have become more mindful. Methods for measuring mindfulness are necessary for several reasons. First, interventions that claim to teach particular skills cannot be thoroughly evaluated without assessing participants' acquisition of these skills. Second, it is difficult to study the mechanisms of action of mindfulness training without measuring mindfulness. For example, the notion that mindfulness training leads to symptom reduction through exposure to unwanted internal experiences cannot be investigated without measuring whether participants become more mindful of these phenomena. Third, most mindfulness-based interventions include several components in addition to mindfulness training. Identification of active ingredients in these interventions could be enhanced with measures of whether treatment components are producing the expected changes.

Several instruments for assessing mindfulness recently have become available. The Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003) is a 15-item instrument measuring attention to and awareness of present-moment experience in daily life. Respondents rate how often they have experiences of acting on automatic pilot, being preoccupied, and not paying attention to the present moment. The instrument has a unidimensional factor structure. The Freiburg Mindfulness Inventory (FMI; Buchheld, Grossman, & Walach, 2001) is a 30-item instrument assessing nonjudgmental present-moment observation and openness to negative experience. It was developed with participants in mindfulness meditation retreats and is designed for use with experienced meditators. The authors note that some items' meanings may be unclear to individuals without such experience. Finally, the Toronto Mindfulness Scale (TMS; Bishop et al., 2003) is a 10-item single-factor instrument measuring attainment of a mindful state during an immediately preceding meditation exercise. That is, participants first complete a meditation exercise and then rate the extent to which they were aware and accepting of their experiences during the exercise.

A new instrument may be useful in several ways. First, Dimidjian and Linehan (2003a, 2003b) and Roemer and Orsillo (2003) have argued that mindfulness is a multifaceted construct that may include observation, undivided attention, a nonjudgmental stance, and perhaps other components. As Smith, Fischer, and Fister (2003) have noted,

the valid assessment of multifaceted constructs is enhanced by identifying and measuring each facet reliably and separately. As facets of mindfulness may correlate differently with other psychological constructs, a multifaceted measure may promote improved understanding of mindfulness by clarifying these differential relationships. Separate measurement of facets of mindfulness also may be helpful to professionals who teach mindfulness by clarifying strengths and weaknesses in their clients' development of mindfulness skills. For these reasons, development of a multidimensional inventory was a primary goal of the present project.

Second, instruments designed for use with experienced meditators may have limited utility for studying mindfulness in other populations. Kabat-Zinn (2003) notes that mindfulness is an inherent human capacity and that "we are all mindful to one degree or another, moment by moment" (pp. 145-146). As it seems important to study mindfulness in a variety of populations, another goal of the present project was to develop an inventory using language understandable to populations without meditation experience. Finally, although assessment of state mindfulness during meditation is a critical element of mindfulness research, its relationship to the general tendency to be mindful in daily life is unknown. Brown and Ryan (2003) argue that the general propensity to be mindful may be related to other psychological constructs relevant to mental health and well-being. Others, as noted earlier, have argued that the ability to be mindful can be cultivated using techniques other than meditation. Thus, instruments that assess mindfulness in daily life and do not require completion of a meditation exercise may be useful.

In summary, the instrument described here has a combination of characteristics not found in other mindfulness scales. It is designed to assess the general tendency to be mindful in daily life, to be understandable to general and clinical populations regardless of meditation experience, and to measure several components of mindfulness.

ITEM DEVELOPMENT

Identifying Components of Mindfulness

Potential components of a multidimensional mindfulness inventory were identified by studying current published descriptions by researchers in psychology and stress reduction (e.g., Kabat-Zinn, 1982; Linehan, 1993a, 1993b; Segal et al., 2002) and by mindfulness teachers in the Buddhist tradition (Goldstein, 2002; Goldstein & Kornfield, 1987; Gunaratana, 2002; Rosenberg, 1998). As many authors describe mindfulness as a set of skills that can be taught and practiced (Linehan, 1993a, 1993b; Segal

et al., 2002), the central goal of this phase of the project was to address the question, "What does one do (or refrain from doing) when being mindful?" The resulting conceptualization of mindfulness skills is most strongly influenced by Linehan (1993a, 1993b) and Dimidjian and Linehan (2003a, 2003b), who have provided the most explicit and detailed behavioral descriptions of mindfulness. Thus, although generally consistent with many accounts of mindfulness, the skills measured are most similar to mindfulness as it is taught in DBT. The following four mindfulness skills were extracted from the current literature.

Observing. All descriptions of mindfulness emphasize the importance of observing, noticing, or attending to a variety of stimuli, including internal phenomena, such as bodily sensations, cognitions, and emotions, and external phenomena, such as sounds and smells (Dimidjian & Linehan, 2003b; Kabat-Zinn, 1990; Segal et al., 2002). Practitioners are encouraged to pay careful attention to elements such as the location, intensity, and duration of sensations, and the pitch, volume, and tone quality of sounds.

Describing. Although some mindfulness teachers advocate observation without labeling (Gunaratana, 2002), many discussions of mindfulness encourage describing, labeling, or noting of observed phenomena by covertly applying words (Goldstein, 2002; Linehan, 1993b; Segal et al., 2002). Labels may be single words such as "sadness" or "thinking," phrases such as "worrying about my job," or complete sentences such as "Ah, here is anger" (Segal et al., 2002). When repetitive patterns of thought are observed, some teachers suggest a comparison to tapes playing in the mind, and practitioners are encouraged to label them. For example, the practitioner might say, "here's my 'no one appreciates me' tape," or "this is my 'what a fool I am' tape" (Rosenberg, 1998; Segal et al., 2002). This type of describing is done nonjudgmentally and without conceptual analysis. That is, participants are encouraged to refrain from judgments (e.g., "it's stupid to think this way") and from speculations about the origins of these patterns. Instead, they are instructed to label them briefly and continue attending to the present moment.

Acting with awareness. Engaging fully in one's current activity with undivided attention, or focusing with awareness on one thing at a time (Hanh, 1976), is a central component of many descriptions of mindfulness. In MBCT, acting with awareness is contrasted with the concept of "automatic pilot" in which behaviors occur without awareness (Segal et al., 2002) because attention is focused elsewhere. As conceptualized here, acting with awareness includes the DBT skills known as "participating" and "one-mindfully." Linehan (1993b) defines participating as

“entering wholly into an activity, becoming one with the activity” and as “throwing yourself into something” (p. 67) and defines one-mindfully as “focusing on one thing in the moment, . . . doing one thing at a time with awareness” and as “bringing the whole person to bear on an activity” (p. 69). Mindfulness practitioners often are encouraged to develop this skill by performing routine activities, such as brushing teeth or washing dishes, with undivided attention.

Accepting (or allowing) without judgment. A fourth skill emphasized by many authors is accepting, allowing, or being nonjudgmental or nonevaluative about present-moment experience. To accept without judgment is to refrain from applying evaluative labels such as good/bad, right/wrong, or worthwhile/worthless (Marlatt & Kristeller, 1999) and to allow reality to be as it is without attempts to avoid, escape, or change it (Dimidjian & Linehan, 2003a, 2003b; Linehan, 1993b; Segal et al., 2002). In clinical practice, this skill often is encouraged when the participant is faced with unwanted experiences, such as aversive affect, cognitions, or sensations (Segal et al., 2002). Recognizing and acknowledging the presence of these phenomena and allowing them to be as they are without immediately rushing to change or eliminate them is central to this skill. Nonjudging is often combined with observing and describing. When faced with unwanted experience, the participant is encouraged to observe it carefully, label it, and allow it to be present (Segal et al., 2002) without evaluation or self-criticism. Nonjudging is not equated with passivity or resignation (Segal et al., 2002). Rather, it is believed to encourage more adaptive responding to problematic situations by preventing automatic, impulsive, maladaptive behaviors.

Items were written reflecting each of these four skills. Content was drawn from the descriptions of mindfulness cited earlier. Observe items included noticing, observing, or paying attention to a variety of internal and external phenomena, including bodily sensations, cognitions, emotions, sights, sounds, and smells. Describe items all referred to a tendency or ability to put sensations, perceptions, thoughts, feelings, emotions, or experiences into words. Act With Awareness items included focusing undivided attention on the current activity or avoiding automatic pilot. Accept Without Judgment items included both the act of making judgments or evaluations and common examples of judgment or self-criticism about one's experiences.

Throughout the process of writing items, preliminary versions of portions of the inventory were completed by samples of students in undergraduate psychology classes. Based on internal consistency analyses and interitem cor-

relations, items were added, dropped, or rewritten. This process culminated in a 77-item version of the Kentucky Inventory of Mindfulness Skills (KIMS) that was used for the initial psychometric analyses (described later), which led to the reduction of the inventory to a final version with 39 items. Participants rated each item on a 5-point Likert-type scale ranging from 1 (*never or very rarely true*) to 5 (*almost always or always true*). Some items were direct descriptions of the mindfulness component being measured, whereas others described the absence of that component and were reverse scored. Nonstandard English was avoided, as was gender, ethnic, and religious bias, slang, and terminology understandable only to individuals with meditation experience.

The following sections describe six studies of the KIMS' psychometric characteristics. Studies 1 through 3 examine content validity of the items, internal consistency, factor structure, and test-retest reliability. Studies 4 through 6 explore relationships with other constructs and differences in KIMS scores between student and clinical samples.

STUDY 1: CONTENT VALIDITY OF KIMS ITEMS

Method

Participants

Content validity was assessed using ratings by experts. Experts included five practicing psychologists who were experienced DBT therapists and six doctoral students in clinical psychology who had completed a graduate course on DBT and had led DBT skills groups for at least 1 year under the supervision of a certified DBT therapist. One student had also co-led an MBCT group. The five practicing therapists and three of the six doctoral students were female.

Procedures

Experts were provided with the 77-item version of the KIMS and instructions that included brief descriptions of the four mindfulness skills. For each item, they were asked to do three tasks. First, they classified each item into the skill category it best represented (Observe, Describe, Act With Awareness, or Accept Without Judgment). Then they rated each item's fit with this category using a 4-point Likert-type scale ranging from 1 (*poor*) to 4 (*excellent*). Next, they rated the quality of each item on the same 4-point scale, considering clarity, bias, and offensiveness.

Results and Discussion

Across the 77 items, percentage of raters who assigned each item to the skill category for which it was written ranged from 45% to 100% with a mean of 86%, indicating that 86% of the raters agreed on which skill the item represented. Mean ratings of items' fit with the selected category ranged from 2.89 to 4.0, with a mean of 3.61. Mean ratings of items' quality ranged from 2.89 to 4.0 with a mean of 3.64. Only 4 items had mean interrater sorting agreements below 60%, and only 2 had mean fit or quality ratings below 3.00. These items were eliminated in the internal consistency analyses described in Study 2, in which the inventory was reduced to 39 items. For the final 39 items, mean interrater agreement on assignment of items to skill categories ranged from 64% to 100%, with a mean of 86%. Mean fit and quality ratings were virtually unchanged at 3.61 and 3.65, respectively. Overall, findings suggest that expert raters found the items to be clear and well written representations of mindfulness skills.

STUDY 2: INTERNAL CONSISTENCY, FACTOR STRUCTURE, AND SCALE INTERCORRELATIONS

Method

Participants and Procedures

Participants in this study came from three separate samples. Student Sample 1 included 205 undergraduates enrolled in psychology courses at the University of Kentucky. Most were 18 to 22 years old, about 60% were female, and about 85% were Caucasian. They completed the 77-item version of the KIMS in exchange for class credit. Student Sample 2 included 215 undergraduate psychology students with similar demographic characteristics. These students completed the 39-item version of the KIMS during class sessions. The third sample included 26 adults diagnosed with borderline personality disorder (BPD) who were participating in outpatient DBT programs. They completed the 39-item KIMS during a regular meeting of their weekly skills training group. Their mean age was 36 years (ranging from 20 to 52), and they averaged 14 years of education. All were Caucasian, and all but 1 were female. Their BPD diagnoses typically were longstanding, documented in their previous mental health records, and confirmed by their DBT therapists using an interview based on *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* criteria. Most had concurrent Axis I diagnoses. The most frequent of these were major

depressive disorder, posttraumatic stress disorder, and bipolar II.

Results and Discussion

Internal Consistency

Responses from Student Sample 1 were used to examine internal consistency and to reduce the number of items. Items written for each of the four mindfulness skills were separated into four scales (Observe, Describe, Act With Awareness, Accept Without Judgment), and internal consistency analyses were conducted for each scale separately. Coefficient alpha was calculated, and item-total and interitem correlations were examined. Those items with the lowest item-total correlations were eliminated. Some items with very high interitem correlations also were eliminated as they appeared redundant with other items. Coefficient alpha then was recalculated, and the process was repeated until the scale had been reduced to 8 to 12 items while retaining adequate internal consistency and content coverage. At the conclusion of this process, 39 items remained. Alpha coefficients for Observe, Describe, Act With Awareness, and Accept Without Judgment were .91, .84, .83, and .87, respectively. Alpha coefficients also were calculated for Student Sample 2 and were found to be .85, .86, .76, and .87, respectively. Thus, internal consistency appears to be adequate to good (Nunnally, 1978). Item numbers and content, scoring direction, alpha coefficients, and mean interitem correlations (for Student Sample 1) can be seen in Table 1 along with results of the factor analysis described next.

Exploratory Factor Analyses

Using Student Sample 1, responses to the remaining 39 items were subjected to exploratory factor analysis using principal axis factoring with oblique rotation to allow for correlations between the factors. This analysis yielded nine factors with eigenvalues greater than 1.0 and cumulatively accounting for 64% of the variance. However, the scree plot clearly indicated a four-factor solution. Floyd and Widaman (1995) argue that use of eigenvalues greater than 1.0 often results in overestimation of the number of factors to retain and suggest that the scree plot is a more useful guide. Therefore, a second factor analysis was conducted, specifying that four factors should be identified and, again, using principal axis factoring with oblique rotation. This analysis yielded a clear four-factor solution corresponding closely to the four mindfulness skills for which the items were written and accounting for 43% of the variance after factor extraction. All but 1 of the items

TABLE 1
Factor Structure of the Kentucky Inventory of Mindfulness Skills (KIMS)
in an Undergraduate Sample (N = 205)

Item Number and Content	Factor Loadings			
	1	2	3	4
Observe items				
1. I notice changes in my body, such as whether my breathing slows down or speeds up.	-.02	.49	-.05	-.05
5. I pay attention to whether my muscles are tense or relaxed.	.03	.53	.03	-.07
9. When I'm walking, I deliberately notice the sensations of my body moving.	-.02	.59	.05	-.02
13. When I take a shower or a bath, I stay alert to the sensations of water on my body.	-.06	.59	.08	-.03
17. I notice how foods and drinks affect my thoughts, bodily sensations, and emotions.	-.06	.59	.06	.05
21. I pay attention to sensations, such as the wind in my hair or sun on my face.	-.04	.60	-.02	.06
25. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.	-.02	.59	-.12	.10
29. I notice the smells and aromas of things.	.07	.62	.05	.08
30. I intentionally stay aware of my feelings.	.20	.42	-.01	-.25
33. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.	-.00	.60	-.02	.16
37. I pay attention to how my emotions affect my thoughts and behavior.	.14	.41	.06	-.35
39. I notice when my moods begin to change.	.11	.35	-.06	-.39
Describe items				
2. I'm good at finding the words to describe my feelings.	.86	.05	.02	.02
6. I can easily put my beliefs, opinions, and expectations into words.	.79	-.03	.01	-.00
10. I'm good at thinking of words to express my perceptions, such as how things taste, smell, or sound.	.65	.06	.16	.06
14. It's hard for me to find the words to describe what I'm thinking. ^a	.69	-.11	.08	.18
18. I have trouble thinking of the right words to express how I feel about things. ^a	.74	-.12	-.03	.20
22. When I have a sensation in my body, it's difficult for me to describe it because I can't find the right words. ^a	.66	-.04	-.01	.22
26. Even when I'm feeling terribly upset, I can find a way to put it into words.	.66	.04	.03	-.07
34. My natural tendency is to put my experiences into words.	.76	.03	-.07	-.15
Act With Awareness items				
3. When I do things, my mind wanders off and I'm easily distracted. ^a	.14	-.08	.60	.09
7. When I'm doing something, I'm only focused on what I'm doing, nothing else.	.06	.03	.60	-.05
11. I drive on "automatic pilot" without paying attention to what I'm doing. ^a	.12	.08	.43	.10
15. When I'm reading, I focus all my attention on what I'm reading.	.11	.07	.45	-.06
19. When I do things, I get totally wrapped up in them and don't think about anything else.	-.00	.16	.54	-.08
23. I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted. ^a	.14	-.22	.71	.01
27. When I'm doing chores, such as cleaning or laundry, I tend to daydream or think of other things. ^a	-.17	-.01	.47	-.01
31. I tend to do several things at once rather than focusing on one thing at a time. ^a	-.11	-.12	.54	.07
35. When I'm working on something, part of my mind is occupied with other topics, such as what I'll be doing later, or things I'd rather be doing. ^a	-.08	-.09	.75	.08
38. I get completely absorbed in what I'm doing, so that all my attention is focused on it.	.00	.14	.63	-.07
Accept Without Judgment items				
4. I criticize myself for having irrational or inappropriate emotions. ^a	.12	.17	.01	.76
8. I tend to evaluate whether my perceptions are right or wrong. ^a	-.16	-.12	-.06	.56
12. I tell myself that I shouldn't be feeling the way I'm feeling. ^a	.14	.06	.04	.67
16. I believe some of my thoughts are abnormal or bad and I shouldn't think that way. ^a	.24	.04	-.03	.61
20. I make judgments about whether my thoughts are good or bad. ^a	-.07	.03	.07	.71
24. I tend to make judgments about how worthwhile or worthless my experiences are. ^a	.02	-.15	.05	.49
28. I tell myself that I shouldn't be thinking the way I'm thinking. ^a	.10	.13	.01	.78
32. I think some of my emotions are bad or inappropriate and I shouldn't feel them. ^a	.18	.11	-.06	.71
36. I disapprove of myself when I have irrational ideas. ^a	-.00	-.04	.00	.65
Coefficient alpha	.91	.84	.83	.87
Mean interitem correlation	.55	.30	.33	.44
Percentage of variance accounted for	16.71	12.34	8.28	5.83

a. Reverse-scored item.

had loadings of .40 or greater on the factor for which they were intended, with most loadings falling well above this level. Most of the items showed very small loadings on the other three factors. However, three Observe items showed moderate negative loadings on the Accept Without Judgment factor that were similar in magnitude to their positive loadings on the Observe factor (Items 30, 37, and 39 in Table 1). Their content addressed noticing or attending to moods, emotions, and feelings. Although eliminating these 3 items might have yielded a more independent Observe factor, these items were retained because their content was judged to be necessary for thorough coverage of the Observe skill. Factor loadings can be seen in Table 1.

Confirmatory Factor Analysis

The four-factor structure of the KIMS was subjected to confirmation on an independent sample, using confirmatory factor analysis (CFA). To examine whether the factor structure would be maintained in a sample with a wider range of ages and psychological symptoms, the confirmation sample combined Student Sample 2 with the BPD sample (total $N = 241$). CFA provides fit indices, which indicate the degree to which the covariances among the items are accounted for by the hypothesized factor model. We chose two fit indices for these analyses: the comparative fit index (CFI: Bentler, 1990) and the root mean square error of approximation (RMSEA: Marsh, Balla, & Hau, 1996). Convention holds that a CFI exceeding .90 indicates good fit between a model and the data. For the RMSEA, close fit is identified by a value of .05, fair fit by a value of .08, and marginal fit by a value of .10 (Browne & Cudeck, 1993). There are a number of estimation methods; we chose maximum likelihood because of its relatively robust performance in a variety of situations (Hu, Bentler, & Kano, 1992).

Conducting a four-factor CFA on 39 items involves estimating 78 covariances simultaneously, which is procedurally cumbersome even with very large samples. A common solution to this problem is to construct item parcels, or groups of items, to reduce the number of covariances to be estimated (West, Finch, & Curran, 1995); doing so is appropriate for internally consistent and content-homogeneous scales (West et al., 1995). We created four parcels for each factor (first item to Parcel 1, second item to Parcel 2, third item to Parcel 3, fourth item to Parcel 4, fifth item to Parcel 1, and so on). We averaged the item scores within each parcel. Thus, each a priori factor was represented by four indicators. A given factor's indicators were not allowed to correlate with other factors nor were error terms allowed to corre-

TABLE 2
Intercorrelations Among Kentucky Inventory
of Mindfulness Skills (KIMS) Scales
in Combined Sample ($N = 445$)

<i>Scale</i>	<i>Describe</i>	<i>Act/Aware</i>	<i>Accept</i>
Observe	.22*	.09	-.14*
Describe	—	.26*	.34*
Act/Aware	—	—	.29*

NOTE: Act/Aware = Act With Awareness.

* $p < .01$

late. Consistent with the exploratory factor analyses, we allowed the four factors to intercorrelate.

The hypothesized four-factor model fit Sample 2 well: CFI = .95, RMSEA = .07 (90% confidence interval: .05 to .08). Loadings of parcels on factors were consistently high, ranging from .62 to .91, with 15 of the 16 at .70 or greater. As an important potential contribution of the KIMS is its multidimensional nature, it was important to consider whether a more parsimonious, one-factor model would provide comparable fit to the sample data. For this model, we specified one factor, with all 16 item parcels loading on that factor. The fit of this model was quite poor: CFI = .41, RMSEA = .22 (90% confidence interval: .21 to .23), suggesting that the replicated four-factor structure of the KIMS is a much better fit to the data than a single-factor model.

Relationships Between KIMS Scales

As items were written to assess four distinct skills but to be related to the general construct of mindfulness, correlations between KIMS scales were expected to be modest but significant. As shown in Table 2, this pattern was found in most cases. The only exception was the correlation between Observe and Act With Awareness, which was nonsignificant ($r = .09$). In addition, the correlation between Observe and Accept Without Judgment was negative. This finding may suggest that in samples with limited meditation experience, the tendency to attend to experiences is associated with a tendency to be judgmental of them. The factor loadings presented in Table 1 (Items 30, 37, and 39) suggest that this pattern may be most evident with moods and emotions. That is, greater awareness of moods and emotions may be associated with lower levels of acceptance of them. This pattern should be examined in samples of experienced meditators, who would be expected to show high levels of both observation and acceptance of moods and emotions and perhaps a positive correlation between these two scales.

STUDY 3: TEST-RETEST RELIABILITY

Method

Participants were 49 members of Student Sample 2 who completed the 39-item version of the KIMS during a second class session 14 to 17 days following the first administration.

Results and Discussion

Correlations between Time 1 and Time 2 were computed separately for each scale. Test-retest correlations for the Observe, Describe, Act With Awareness, and Accept Without Judgment scores were .65, .81, .86, and .83, respectively, indicating adequate to good test-retest reliability. Paired samples *t* tests showed no significant differences between scores at Time 1 and Time 2.

STUDY 4: RELATIONSHIPS BETWEEN KIMS AND OTHER CONSTRUCTS

This study examined relationships between KIMS scales and other constructs expected to be related to mindfulness. (As the MAAS was published after data for Study 4 had been collected, it is addressed in Study 5). One difficulty for construct validation of the KIMS is that investigators have only recently begun to define and measure mindfulness and to consider its relations with other constructs. In particular, little has been established about the dimensions of mindfulness and their differential relationships with other measures. Accordingly, we propose and test a series of hypotheses that are stated primarily with respect to mindfulness in general. We offer speculations about specific KIMS scales likely to correlate with different measures but acknowledge the tentative nature of these hypotheses. The process of construct validation of the KIMS, or any mindfulness measure, will have the bootstrapping quality described by Cronbach and Meehl (1955). That is, support for initial, tentative hypotheses will increase confidence in the measure and lead to elaborated theory and more specific hypotheses based on its performance.

Method

Participants

A subset of 130 of the 205 members of Student Sample 1 completed a packet of measures of other constructs during the same session in which they completed the KIMS.

The mean age of this subgroup was 19.6 years, 56% were female, and 85% were freshmen or sophomores. Racial composition was 86% White, 9% Black, and 5% other races or ethnicities.

Measures and Predictions

Demographic questionnaire. This form requested participants' age, gender, year in school, and race. Participants also rated their meditation experience using a 5-point Likert-type scale ranging from *none* to *a lot*. Although mindfulness scores were expected to be higher in individuals with more meditation experience, this sample was expected to have a restricted range of meditation experience, thus limiting the potential for significant relationships to emerge.

NEO Five Factor Inventory (NEO-FFI; Costa & McCrae, 1992). The NEO-FFI is a 60-item self-report measure of the domains of the five-factor model of personality, including neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Several elements of openness, including receptivity to ideas, attentiveness to inner feelings, and curiosity about inner and outer worlds, seem consistent with the nonjudgmental observation encouraged by mindfulness practice. For this reason, significant positive correlations between openness and KIMS scores, especially Observe and Accept, were predicted. In addition, the empirical literature suggests that mindfulness training is associated with reduced symptoms and increased well-being (Baer, 2003; Brown & Ryan, 2003). As neuroticism measures the tendency to experience negative affect, negative correlations between KIMS scores and neuroticism were expected.

Brief Symptom Inventory (BSI; Derogatis, 1992). The BSI is the short form of the Symptom Checklist 90-Revised (SCL-90-R; Derogatis, 1983) and includes 53 items rated on a Likert-type scale. It provides scores for nine symptom scales and a global severity index (GSI). Only the GSI is reported here. As noted earlier, mindfulness practice is associated with lowered symptoms. Thus, negative correlations between KIMS scores and BSI scores were predicted.

Trait Meta-Mood Scale (TMMS; Salovey, Mayer, Goldman, Turvey, & Palfai, 1995). The TMMS measures emotional intelligence. Its three subscales include attention to one's feelings, clarity of these feelings, and mood repair or ability to regulate one's feelings. Internal consistency of the subscales ranges from .62 to .88 (Salovey et al., 1995), and higher scores are associated with less depression and more life satisfaction (Martinez-Pons, 1997). As mindfulness includes observation and descrip-

tion of feelings, positive correlations between TMMS scores and KIMS scores, particularly for Observe and Describe, were expected.

Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986). The DES is a 28-item questionnaire measuring symptoms of dissociation, defined as “a lack of normal integration of thoughts, feelings, and experiences into the stream of consciousness and memory” (Bernstein & Putnam, 1986, p. 727). Content includes lack of awareness of one’s own behaviors or of ongoing experience. As mindfulness involves awareness of current experience, negative correlations between KIMS scores and the DES were expected, especially for Observe and Act With Awareness.

Tellegen Absorption Scale (Tellegen & Atkinson, 1974; see also Tellegen, 1992). This 34-item instrument measures the tendency for one’s entire attentional capacity to become completely involved in experiencing a specific attentional object, which could be “a human being, a sound, a remembered incident, or an aspect of oneself” (Tellegen & Atkinson, 1974, p. 274). Although this scale’s relationship to mindfulness seems conceptually important, it is difficult to predict. Some of the items appear to describe a mindful state, such as listening to music with undivided attention and noticing elements in nature with openness and curiosity. Others appear to describe functioning on automatic pilot, without awareness of one’s actions, because attention is absorbed elsewhere. Scores on this scale have been found to be related both to daydreaming (Crawford, 1982) and to experiential involvement (Wild, Kuiken, & Schopflocher, 1995), which is defined as the experience of becoming highly immersed or engaged in attentional objects such as activities, imagery, or feelings. As it appears that absorption is not always consistent with mindfulness, correlations between the Absorption Scale and the KIMS were predicted to be nonsignificant.

Toronto Alexithymia Scale (TAS-20; Bagby, Parker, & Taylor, 1993, Bagby, Taylor, & Parker, 1993). Alexithymia (literally, “no words for feelings”) includes a lack of ability to identify feelings, to distinguish bodily sensations from emotions, and to describe feelings, as well as an externally oriented cognitive style (lack of interest in feelings, cognitions, or motivations). It has been studied as a possible risk factor for a variety of psychiatric and stress-related disorders (Taylor, Bagby, & Parker, 1992). The TAS-20 has shown adequate psychometric characteristics in student and psychiatric outpatient samples (Bagby, Taylor, et al., 1993). As mindfulness includes observation and description of feelings and sensations with an attitude of interest, TAS-20 scores were predicted to be negatively

correlated with KIMS scores, particularly Observe and Describe.

Acceptance and Action Questionnaire (AAQ; Hayes et al., in press). The AAQ is a 9-item measure of experiential avoidance, which is defined as negative evaluation of and unwillingness to maintain contact with internal experiences, such as bodily sensations, emotions, cognitions, and urges. This construct also includes efforts to avoid, escape, change, or terminate these experiences, even when doing so is harmful (Hayes et al., in press). Hayes, Wilson, Gifford, Follette, and Strosahl (1996) note that experiential avoidance is associated with increased levels of psychopathology and decreased quality of life. The AAQ has a single-factor structure and has been shown to correlate with measures of psychopathology (Hayes et al., in press). As experiential avoidance seems to include both unwillingness to observe internal experiences and a propensity to be judgmental and nonaccepting of them, correlations between KIMS scores and the AAQ were expected to be negative, especially for Observe and Accept Without Judgment.

Satisfaction With Life Scale (SWLS; Pavot & Diener, 1993). The SWLS is a 5-item measure of individuals’ satisfaction with their lives. Although the empirical literature often describes mindfulness training as a method for reducing symptoms, several authors have noted that mindfulness meditation is also concerned with the cultivation of positive qualities, such as wisdom and equanimity (Kabat-Zinn, 2000), and that assessment of a broader range of outcomes, such as subjective well-being and quality of life, might be informative (Baer, 2003). Brown and Ryan (2003) showed that the MAAS was related to several well-being scales. Thus, correlations between the SWLS and KIMS scores were expected to be positive.

Paulhus Deception Scales—Impression Management (PDS-IM; Paulhus, 1998). The Impression Management scale of the PDS measures the purposeful attempt to create a good impression by presenting oneself in unrealistically positive terms. High scores are obtained by denying common faults (e.g., driving faster than the speed limit) and endorsing uncommon virtues (e.g., never swearing). The IM scale has been shown to be psychometrically sound. Paulhus (1998) notes that for normal populations with no known incentive to engage in impression management, IM probably measures a trait, such as social conventionality, rather than a response bias. In such populations, IM has been shown to correlate with conscientiousness and agreeableness. Scores on the PDS-IM were predicted to fall in the average range for student samples and to show small or nonsignificant correlations with KIMS scores.

TABLE 3
Relationships Between Kentucky Inventory of Mindfulness Skills (KIMS)
Scales and Other Constructs in Undergraduate Sample ($n = 130$)

Construct (Scale)	KIMS Scales			
	Observe	Describe	Act/Aware	Accept
Personality (NEO-FFI)				
Neuroticism	-.06	-.41**	-.31**	-.42**
Extraversion	.06	.36**	.15	.17
Openness	.50**	.20	.01	-.04
Agreeableness	.05	.14	.27*	.10
Conscientiousness	.20	.37**	.44**	.20
Psychopathology (BSI-GSI)	-.01	-.33**	-.38**	-.29**
Emotional intelligence (TMMS)				
Attention to feelings	.38**	.31**	-.15	-.12
Clarity of feelings	.26*	.61**	.19	.08
Mood repair	.09	.29**	.24*	.14
Total	.34**	.54**	.10	.03
Alexithymia (TAS)				
Difficulty identifying feelings	-.24*	-.60**	-.17	-.24*
Difficulty describing feelings	-.28**	-.74**	-.18	-.25*
External thinking	-.30**	-.26*	-.01	.13
Total	-.33**	-.66**	-.15	-.15
Experiential Avoidance (AAQ)	-.09	-.35**	-.30**	-.26*
Absorption (Absorption Scale)	.39**	.02	-.17	-.16
Dissociative Experiences (DES)	-.10	-.22	-.28*	-.11
Life Satisfaction (SWLS)	-.04	.28**	.21	.13
Impression Mgmt (PDS-IM)	-.01	.24*	.22	-.09

NOTE: Act/Aware = Act With Awareness; BSI = Brief Symptom Inventory; GSI = Global Severity Index; TMMS = Trait Meta-Mood Scale; TAS = Toronto Alexithymia Scale; AAQ = Acceptance and Action Questionnaire; DES = Dissociative Experiences Scale; SWLS = Satisfaction With Life Scale; PDS-IM = Paulhus Deception Scales–Impression Management.

* $p < .01$. ** $p < .001$.

Results and Discussion

Relationships Between KIMS Scales and Demographic Variables

One-way analysis of variance showed no differences between males and females for any of the KIMS scales. Chi-square analysis showed no differences based on race. Correlations between KIMS scores and age and year in school were nonsignificant. However, the Observe scale was significantly correlated with meditation experience ($r = .29, p < .001$), in spite of the restricted range of experience in the sample (87% of participants reported *none* or *a little*). Relationships between mindfulness and meditation experience should be investigated in samples with better representation of levels of experience.

Relationships Between KIMS Scales and Other Constructs

Correlations between KIMS scores and other measures are shown in Table 3. Because of the large number of cor-

relations calculated from this sample, only those with $p < .01$ are described as significant.

Personality. As expected, neuroticism was negatively correlated with most KIMS scores (all but Observe), suggesting an inverse relationship between mindfulness skills, as operationalized in these scales, and the experience of negative affect. Extraversion was significantly related only to Describe, suggesting that a tendency to put one's experiences into words is related to talkativeness and sociability. Agreeableness was correlated only with Act With Awareness whereas conscientiousness was correlated with Describe and Act With Awareness. Although openness was predicted to be related to mindfulness, this was true only for Observe ($r = .50, p < .001$), suggesting that individuals higher in openness tend to observe their experiences more attentively but may not label them with words, refrain from judging them, or act with greater awareness than others. The relationship between mindfulness and openness should be clarified with research using the NEO PI-R, which provides separate scores for the facets of each domain.

Psychological symptoms. GSI scores were significantly negatively correlated with three of the four KIMS scores, suggesting that these mindfulness skills may be associated with mental health. However, Observe scores were unrelated to GSI scores, suggesting a lack of relationship between noticing or attending and psychological symptoms.

Emotional intelligence. As expected, emotional intelligence showed significant positive correlations with mindfulness scores. The strongest relationships were seen with the Describe scale, suggesting that the ability and tendency to label one's experiences may be strongly associated with emotional intelligence. The Observe scale was related to all TMMS scores except mood repair, perhaps suggesting that observation alone is not associated with emotion regulation. However, Act With Awareness was correlated with mood repair, suggesting that the ability to focus attention on present-moment stimuli or activities is associated with emotion regulation. Accept Without Judgment was not significantly related to any of the TMMS scores, suggesting that emotional intelligence, as defined by the TMMS, is not associated with the tendency to make judgments or evaluations of one's internal experiences.

Alexithymia. As expected, alexithymia showed significant negative correlations with mindfulness scores. Again, the strongest relationships were noted with the Describe scale. This is not surprising, as describing one's experiences is central to both constructs as operationalized in these measures. The Observe scale also was significantly negatively correlated with all alexithymia scores. In contrast, Act With Awareness was not related to any of the alexithymia scores, perhaps suggesting that the ability to concentrate fully, with undivided attention, on the activity of the present moment is unrelated to the ability to identify and describe feelings. However, Accept Without Judgment was associated with the first two alexithymia scores, suggesting that those who have more trouble identifying and describing their feelings are likely to be less accepting of them.

Experiential avoidance. As expected, experiential avoidance was significantly negatively correlated with mindfulness scores, with the exception of the Observe scale. That is, individuals with higher levels of avoidance of internal experience are less likely to label their experiences with words, less likely to focus undivided attention on present-moment activity, and less likely to be accepting and nonjudgmental about their experiences. However, a significant relationship for observation alone was not found, suggesting that simply noticing or observing one's experience may not predict one's level of avoidance of this experience.

Absorption. Most relationships between absorption and mindfulness scores were nonsignificant, as expected. However, the correlation between absorption and Observe was .39, ($p < .001$), suggesting that observation of internal and external phenomena is strongly related to becoming absorbed in one's experiences. However, as being absorbed can imply either strong focus on present-moment activity or acting on automatic pilot because attention is absorbed elsewhere, it may not be surprising that most KIMS scales are not correlated with absorption. Additional research might clarify whether components of absorption are differentially related to mindfulness.

Dissociative experiences. Correlations between KIMS scores and the DES were small although negative as predicted. The strongest relationship was seen with Act With Awareness, indicating that the tendency to focus undivided attention on present-moment experience is inversely related to dissociation. The correlation with Describe ($r = .22$) obtained a p value of .012, narrowly missing the criterion for significance of .01 adopted here but suggesting that the ability or tendency to label one's experiences with words may also be inversely related to dissociation.

Life satisfaction. The SWLS score was most strongly associated with the Describe scale ($r = .28$, $p < .001$). The correlation with Act With Awareness was nearly significant by the standard adopted here ($r = .22$, $p = .015$). These findings are roughly consistent with those reported by Brown and Ryan (2003), who noted significant positive correlations between their mindfulness scale (the MAAS) and a variety of well-being measures. Item content for the MAAS most closely resembles the Act With Awareness scale in the KIMS.

Impression management. As expected, relationships between the PDS-IM and the KIMS scales were small. The highest correlations occurred with Describe ($r = .24$, $p < .01$) and Act With Awareness ($r = .22$, $p = .011$). Raw scores for the PDS-IM showed a mean of 6.8 ($SD = 3.5$), which is equivalent to a T -score of 51 and consistent with both general population and college student samples reported in the PDS manual (Paulhus, 1998). Thus, it appears that the current sample was engaging in no more impression management than is typically seen in general population and student samples with no known reason to misrepresent themselves.

Differentiating Mindfulness From Neuroticism and General Distress

Clark and Watson (1995) note the importance of demonstrating that newly developed measures can be differentiated from general distress or neuroticism. Although cor-

relations between most KIMS scales and neuroticism are significant, as expected, they are moderate, suggesting that the scales measure separate but related constructs. In addition, internal consistency coefficients for the KIMS scales are far higher than their correlations with neuroticism. In the case of the Accept scale, for example, which shows the largest correlation with neuroticism ($-.42$), subtracting the amount of variance accounted for by this relationship ($.42^2$) from the Accept scale's alpha coefficient ($.87$) shows that 69% of the systematic variance in the Accept scale is independent of its relationship with neuroticism. The same point can be made about KIMS scales' relationships with psychological symptoms, as measured by the BSI, or about any of the relationships displayed in Table 3. Overall, KIMS scales appear to be related to but distinguishable from these constructs.

STUDY 5: CORRELATIONS BETWEEN KIMS SCORES AND THE MAAS

Method

Relationships between the KIMS and other measures of mindfulness in daily life were not included in Study 4, because no other mindfulness measures suitable for general populations were available. However, the MAAS (Brown & Ryan, 2003) was published just after data collection for the other studies reported here had been completed. To examine relationships between the KIMS and the MAAS, an additional sample of 115 students was recruited to complete both instruments. Their demographics were very similar to the student samples described earlier. As MAAS items primarily describe acting on automatic pilot or being unaware of present-moment experience, the MAAS was expected to correlate most strongly with the Act With Awareness scale of the KIMS. It was also expected to show a pattern of correlations with the other KIMS scales that was similar to the pattern obtained for Act With Awareness, including a nonsignificant correlation with Observe and moderate correlations with Describe and Accept Without Judgment.

Results and Discussion

The expected pattern of correlations between KIMS and MAAS scores was obtained for Observe, $r = .02$ (nonsignificant), for Describe, $r = .24$ ($p < .05$), for Act With Awareness, $r = .57$ ($p < .0001$), and for Accept Without Judgment, $r = .30$ ($p < .001$). These findings suggest that the MAAS is strongly related to the Act With Awareness scale of the KIMS. It is uncorrelated with Observe and moderately related to the other two KIMS scales.

STUDY 6: COMPARISONS BETWEEN KIMS SCORES IN STUDENT AND BPD SAMPLES

Method

Participants were Student Sample 1 ($N = 205$), Student Sample 2 ($N = 215$) and the BPD sample ($N = 26$) described previously. The BPD sample was predicted to have lower KIMS scores than the student sample for two reasons. First, individuals with BPD have been described as lacking in mindfulness skills (Linehan, 1993b). Second, BPD is associated with many severe symptoms, and results of Study 4 showed that KIMS scores were negatively related to psychological symptoms. On the other hand, the BPD sample were all engaged in DBT programs, which include training in mindfulness skills. Although this experience could be expected to increase mindfulness scores over time, most of these participants had begun DBT within the past few months. The minimum duration of standard outpatient DBT is generally 1 year (Linehan, 1993a), and outcome research suggests that although improvements are substantial during that time, most participants continue to score in the clinical range on most outcome measures after 1 year of treatment (Linehan, Armstrong, Suarez, Allmon, & Heard, 1991; Linehan, Heard, & Armstrong, 1993). Therefore, these patients' relatively brief exposure to mindfulness training was not expected to result in KIMS scores in the student sample range.

Results and Discussion

Mean scores on the KIMS scales for the three samples are shown in Table 4. One-way analyses of variance showed significant differences between groups for Describe, Act With Awareness, and Accept Without Judgment. Scheffé post hoc comparisons showed that for each of these scales, the BPD sample scored significantly lower than the two student samples, which did not differ from each other. These findings suggest that lower scores for these mindfulness skills are associated with BPD and are consistent with data presented earlier in suggesting that mindfulness scores are related to mental health. However, student and BPD samples did not differ on Observe. This is consistent with the nonsignificant correlations presented in Study 4 of Observe with the BSI-GSI and the neuroticism domain of the NEO-FFI and suggests that observation alone is not related to level of psychological symptoms or negative affect. Whether individuals with BPD would score lower than the general population on Observe before they have begun mindfulness training cannot be determined from these data and should be examined

TABLE 4
Means, Standard Deviations, Univariate *F* Ratios, and Scheffé Test Comparisons for Kentucky Inventory of Mindfulness Skills (KIMS) Scales in Three Samples

<i>KIMS Scale</i>	<i>Student Sample 1</i> (<i>N</i> = 205)		<i>Student Sample 2</i> (<i>N</i> = 215)		<i>BPD Sample</i> (<i>N</i> = 26)		<i>F</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Observe	36.61 _a	6.92	38.63 _a	7.80	36.77 _a	7.92	2.12
Describe	27.61 _a	5.77	28.21 _a	5.48	22.25 _b	6.57	12.75**
Act With Awareness	28.89 _a	5.40	29.22 _a	5.37	24.09 _b	5.45	7.48**
Accept Without Judgment	30.11 _a	6.01	29.61 _a	6.50	21.50 _b	7.49	21.60**

NOTE: In each row, means with the same subscript do not differ at $p < .05$ using Scheffé post hoc comparisons.

** $p < .001$.

in future research. It is also important to compare mindfulness scores in BPD and other clinical samples who are not engaged in mindfulness training and in BPD samples both before and after completion of DBT.

GENERAL DISCUSSION

The purpose of this project was the development and initial validation of a self-report inventory of mindfulness skills. The psychometric evidence presented suggests that the inventory may be a useful tool for the assessment of mindfulness skills, especially as they are conceptualized in DBT. Content validity evaluation by DBT experts yielded high ratings of item clarity and representation of mindfulness skills. High internal consistency and adequate to good test-retest reliability were demonstrated. A clear four-factor structure was demonstrated in the initial sample and confirmed in a second sample, and this four-factor structure was found to be a much better fit to the data than an alternative single-factor structure. Relationships with other constructs were largely as expected, with mindfulness scores often positively associated with constructs related to mental health. Comparison with a small clinical sample showed significantly lower scores for three of the four mindfulness scales, providing additional support for the relationship between mindfulness and mental health, especially BPD. Support for the multidimensional view of mindfulness was found in differential relationships between KIMS scales and other constructs. These findings suggest that a multidimensional conceptualization may be helpful in clarifying the nature of mindfulness and its relationships with other constructs.

As noted earlier, the Describe scale was correlated with most of the other constructs examined. These correlations were consistently negative with maladaptive constructs (neuroticism, symptoms) and positive for more adaptive constructs (emotional intelligence), suggesting that the

ability and tendency to apply words to one's experiences is strongly associated with good mental health. These findings are especially interesting because labeling with words is not always recommended by mindfulness teachers in the Buddhist tradition. For example, Gunaratana (2002) emphasizes wordless observation of cognitions, emotions, sensations, and other phenomena, although he acknowledges the utility of verbal labeling in the early stages of several meditation exercises. If wordless observation and acceptance develop with extensive meditation practice, then future research should examine samples of experienced meditators to determine whether the relationships between Describe and other constructs differ from those observed in the present student sample, most of who had little or no meditation experience.

Although the KIMS is based largely on the DBT conceptualization of mindfulness, efforts were made during item development to be consistent with descriptions found in other empirically supported mindfulness-based interventions, especially MBSR and MBCT. Differences between these approaches in conceptualizing mindfulness seem less important than their similarities. DBT organizes the concepts differently, by classifying mindfulness skills into what one does (e.g., observing, describing) and how one does it (one-mindfully, nonjudgmentally). However, the skills are very similar to the attending, labeling, undivided attention, and nonjudgmental acceptance discussed in MBSR and MBCT. In teaching mindfulness, MBSR and MBCT rely heavily on 45-minute meditation practices conducted while sitting still with eyes closed, whereas DBT emphasizes shorter exercises involving routine activities (washing dishes, making tea). However, the skills being developed are very similar across all of these exercises. Perhaps one important difference is the attitude of friendly curiosity and interest toward internal experience that is emphasized in MBCT more than in DBT. As noted below, the KIMS items may not adequately capture this element. However, use of the KIMS with participants in a

variety of mindfulness-based interventions seems likely to yield interesting information about the effects of mindfulness training. Additional research may be required to clarify whether elements of some interventions are not well captured by the KIMS.

Several limitations of this research must be noted. First, in spite of the high content validity ratings obtained, limitations in the content coverage are evident. For example, mindful awareness can be applied equally to internal phenomena (cognitions, emotions) and external stimuli (sights, sounds, smells). Although the Observe scale includes both internal and external phenomena, most of the Describe and Accept Without Judgment items target internal stimuli. Items describing nonjudgmental acceptance of external stimuli, such as other people, situations, and events, were initially developed for the Accept Without Judgment scale. Unfortunately, these items had to be deleted because of low item-total correlations leading to poor internal consistency. Thus, the KIMS has better coverage of internal than external targets of mindfulness, especially for Describe and Accept Without Judgment. In addition, although the Accept Without Judgment items appear to capture a nonjudgmental stance toward internal experience, they may not adequately represent the attitude of friendly interest and curiosity toward this experience that is described in MBCT (Segal et al., 2002). Additional research may be required to clarify the nature of nonjudgmental acceptance as it is described in some interventions.

Another limitation is that mindfulness may be a more integrated phenomenon than is implied by the creation of four scales. In practice, mindful individuals probably bring undivided attention and a nonjudgmental stance to observing, describing, and acting (Linehan, 1993a, 1993b). This limitation can best be seen with the Describe items, which do not specify the quality of words that respondents apply to their experiences. That is, respondents could endorse high levels of describing when the words they generally use are very judgmental. On the other hand, the separation of mindfulness into four elements may be helpful to professionals teaching mindfulness skills by clarifying strengths and weaknesses in their clients or students. For example, a client with high Observe and Describe scores but a low Accept score could be queried about the words he or she uses when labeling experiences and encouraged to use less judgmental words if appropriate. In general, the availability of four scales allows the examination of a profile of scores for each respondent, which may be more informative than a single mindfulness score.

The inclusion of solely reverse-scored items on the Accept Without Judgment scale also may be a limitation. Direct-scored items were investigated but were eliminated

because of poor item-total correlations. A similar phenomenon was reported by Brown and Ryan (2003) in the development of the MAAS, which is entirely reverse-scored. These authors speculate that as mindless states appear to be more common than mindful states (McIntosh, 1997), it may be easier for respondents to recognize and report on them. Perhaps this is especially true of items describing a nonjudgmental attitude toward one's internal experience.

Although the reliance on student samples may be another limitation, several authors have argued that mindfulness is a naturally occurring characteristic that is likely to show meaningful variation even in populations without meditation experience (Brown & Ryan, 2003; Kabat-Zinn, 2003). Findings reported here support this notion, as numerous expected relationships with other constructs were confirmed. The small BPD sample included here provides promising evidence for the potential utility of the KIMS in clinical populations. Additional research should examine its reliability, validity, and factor structure in clinical samples and in experienced meditators.

Several other directions for future research should be noted. As training in mindfulness skills is expected to result in higher KIMS scores, it is essential to examine changes in KIMS scores during the course of mindfulness-based interventions. These changes should be compared to any changes produced by other forms of psychotherapy that do not include mindfulness skills training. For participants in mindfulness-based interventions, relations between changes in KIMS scores and the extent of home practice of mindfulness skills also should be examined. Relations between changes in KIMS scores and changes in distress levels also should be studied. Lastly, although relationships between KIMS scales and impression management were small, other forms of social desirability, such as self-deceptive enhancement (Paulhus, 1998) were not examined.

In summary, these findings suggest that the KIMS may be a useful tool for researchers and clinicians working with mindfulness and its applications. As Dimidjian and Linehan (2003a) have noted, "the lack of a clear operational definition of mindfulness has given rise to considerable and unfortunate ambiguity in the field" (p. 166). The availability of measures of mindfulness may lead to increased consensus about how to define it by clarifying its general nature and its relationships with other constructs.

REFERENCES

- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*, 125-143.

- Bagby, R. M., Parker, J. D. A., & Taylor, G. J. (1993). The twenty-item Toronto Alexithymia Scale—I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research, 38*, 23-32.
- Bagby, R. M., Taylor, G. J., & Parker, J. D. A. (1993). The twenty-item Toronto Alexithymia Scale—II. Convergent, discriminant, and concurrent validity. *Journal of Psychosomatic Research, 38*, 33-40.
- Bentler, P. M. (1990). Comparative fit indices in structural models. *Psychological Bulletin, 107*, 238-246.
- Bernstein, E. M., & Putnam, F. W. (1986). Development, reliability, and validity of a dissociation scale. *Journal of Nervous and Mental Disease, 174*, 727-735.
- Bishop, S. R., Segal, Z. V., Lau, M., Anderson, N. C., Carlson, L., Shapiro, S. L., et al. (2003). *The Toronto Mindfulness Scale: Development and validation*. Manuscript under review.
- Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822-848.
- Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136-162). Newbury Park, CA: Sage.
- Buchheld, N., Grossman, P., & Walach, H. (2001). Measuring mindfulness in insight meditation (Vipassana) and meditation-based psychotherapy: The development of the Freiburg Mindfulness Inventory (FMI). *Journal for Meditation and Meditation Research, 1*, 11-34.
- Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment, 7*, 309-319.
- Costa, P. T., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO-FFI): Professional manual*. Odessa, FL: Psychological Assessment Resources.
- Crawford, J. J. (1982). Hypnotizability, daydreaming styles, imagery, vividness, and absorption: A multidimensional study. *Journal of Personality and Social Psychology, 42*, 915-926.
- Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin, 52*, 281-302.
- Derogatis, L. R. (1983). *SCL-90-R: Administration, scoring, and procedures manual—II*. Towson, MD: Clinical Psychometric Research.
- Derogatis, L. R. (1992). *The Brief Symptom Inventory (BSI): Administration, scoring, and procedures manual—II* (2nd ed.). Minneapolis, MN: National Computer Systems.
- Dimidjian, S., & Linehan, M. M. (2003a). Defining an agenda for future research on the clinical application of mindfulness practice. *Clinical Psychology: Science and Practice, 10*, 166-171.
- Dimidjian, S., & Linehan, M. M. (2003b). Mindfulness practice. In W. O'Donohue, J. E. Fisher, & S. C. Hayes (Eds.), *Empirically supported techniques of cognitive behavior therapy: A step-by-step guide for clinicians*. New York: John Wiley.
- Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment, 3*, 286-299.
- Goldstein, J. (2002). *One Dharma: The emerging Western Buddhism*. San Francisco: Harper Collins.
- Goldstein, J., & Kornfield, J. (1987). *Seeking the heart of wisdom: The path of insight meditation*. Boston: Shambhala Classics.
- Gunaratana, B. H. (2002). *Mindfulness in plain English*. Somerville, MA: Wisdom.
- Hanh, T. N. (1976). *The miracle of mindfulness: A manual on meditation*. Boston: Beacon.
- Hayes, S. C., & Shenk, C. (in press). Operationalizing mindfulness without unnecessary attachments. *Clinical Psychology: Science and Practice*.
- Hayes, S. C., Strosahl, K., & Wilson, K. G. (1999). *Acceptance and commitment therapy*. New York: Guilford.
- Hayes, S. C., Strosahl, K., Wilson, K. G., Bissett, R. T., Batten, S. V., Bergan, J. et al. (in press). The Acceptance and Action Questionnaire (AAQ) as a measure of experiential avoidance. *Psychological Record*.
- Hayes, S. C., Wilson, K. G., Gifford, E. V., Follette, V. M., & Strosahl, K. (1996). Emotional avoidance and behavioral disorders: A functional dimensional approach to diagnosis and treatment. *Journal of Consulting and Clinical Psychology, 64*, 1152-1168.
- Hu, L. T., Bentler, P. M., & Kano, Y. (1992). Can test statistics in covariance structure analysis be trusted? *Psychological Bulletin, 112*, 351-362.
- Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33-47.
- Kabat-Zinn, J. (1990). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York: Delacorte.
- Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness meditation in everyday life*. New York: Hyperion.
- Kabat-Zinn, J. (2000). Indra's net at work: The mainstreaming of Dharma practice in society. In G. Watson & S. Batchelor (Eds.), *The psychology of awakening: Buddhism, science, and our day-to-day lives* (pp. 225-249). North Beach, ME: Weiser.
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice, 10*, 144-156.
- Linehan, M. M. (1993a). *Cognitive-behavioral treatment of borderline personality disorder*. New York: Guilford.
- Linehan, M. M. (1993b). *Skills training manual for treating borderline personality disorder*. New York: Guilford.
- Linehan, M. M., Armstrong, H. E., Suarez, A., Allmon, D., & Heard, H. L. (1991). Cognitive-behavioral treatment of chronically suicidal borderline patients. *Archives of General Psychiatry, 48*, 1060-1064.
- Linehan, M. M., Heard, H. L., & Armstrong, H. E. (1993). Naturalistic follow-up of a behavioral treatment for chronically parasuicidal borderline patients. *Archives of General Psychiatry, 50*, 157-158.
- Marlatt, G. A., & Gordon, J. R. (1985). *Relapse prevention: Maintenance strategies in the treatment of addictive behaviors*. New York: Guilford.
- Marlatt, G. A., & Kristeller, J. L. (1999). Mindfulness and meditation. In W. R. Miller (Ed.), *Integrating spirituality into treatment* (pp. 67-84). Washington, DC: American Psychological Association.
- Marsh, H. W., Balla, J. R., & Hau, K. Y. (1996). An evaluation of incremental fit indices: A clarification of mathematical and empirical properties. In G. A. Marcoulides & R. E. Schumacker (Eds.), *Advanced structural equation modeling: Issues and techniques* (pp. 315-353). Mahwah, NJ: Lawrence Erlbaum.
- Martinez-Pons, M. (1997). The relation of emotional intelligence with selected areas of personal functioning. *Imagination, cognition, and personality, 17*, 3-13.
- McIntosh, W. D. (1997). East meets West: Parallels between Zen Buddhism and social psychology. *International Journal for the Psychology of Religion, 7*, 37-52.
- Nunnally, J. N. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- Parks, G. A., Anderson, B. K., & Marlatt, G. A. (2001). Relapse prevention therapy. In N. Heather, T. J. Peters, & T. Stockwell (Eds.), *International handbook of alcohol dependence and problems* (pp. 575-592). New York: John Wiley.
- Paulhus, D. L. (1998). *Paulhus Deception Scales (PDS): The Balanced Inventory of Desirable Responding—7*. North Tonawanda, NY: Multi-Health Systems, Inc.
- Pavot, W., & Diener, E. (1993). Review of the Satisfaction With Life Scale. *Psychological Assessment, 5*, 164-172.
- Roemer, L., & Orsillo, S. M. (2003). Mindfulness: A promising intervention strategy in need of further study. *Clinical Psychology: Science and Practice, 10*, 172-178.
- Rosenberg, L. (1998). *Breath by breath*. Boston: Shambhala.
- Salovey, P., Mayer, J. D., Goldman, S. L., Turvey, C., & Palfai, T. P. (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the Trait Meta-Mood Scale. In J. W. Pennebaker

- (Ed.), *Emotion, disclosure, & health* (pp. 125-154). Washington, DC: American Psychological Association.
- Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: A new approach to preventing relapse*. New York: Guilford.
- Smith, G. T., Fischer, S., & Fister, S. M. (2003). Incremental validity principles in test construction. *Psychological Assessment*, 15, 467-477.
- Taylor, G. J., Bagby, R. M., & Parker, J. D. A. (1992). The revised Toronto Alexithymia Scale: Some reliability, validity and normative data. *Psychotherapy and Psychosomatics*, 57, 34-41.
- Teasdale, J. D. (1999). Metacognition, mindfulness, and the modification of mood disorders. *Clinical Psychology and Psychotherapy*, 6, 146-155.
- Tellegen, A. (1992). *Note on the structure and meaning of the MPQ Absorption Scale*. Unpublished manuscript, University of Minnesota.
- Tellegen, A., & Atkinson, G. (1974). Openness to absorbing and self-altering experiences ("absorption"): A trait related to hypnotic susceptibility. *Journal of Abnormal Psychology*, 83, 268-277.
- West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies. In R. H. Hoyle (Ed.), *Structural equation MODELING* (pp. 56-75). Thousand Oaks, CA: Sage.
- Wild, T. C., Kuiken, D., & Schopflocher, D. (1995). The role of absorption in experiential involvement. *Journal of Personality and Social Psychology*, 69, 569-579.

Ruth A. Baer, Ph.D., is an associate professor of psychology at the University of Kentucky. Her research interests include mindfulness-based interventions, relationships between mindfulness and other psychological constructs, and validity of self-report assessment.

Gregory T. Smith, Ph.D., is an associate professor of psychology at the University of Kentucky. His research interests include psychometric and validity theory, risk for eating disorders and problem drinking, and integrating personality and psychosocial learning models of risk.

Kristin B. Allen, M.S., is a psychological associate at the Gratz Park Clinic at the Comprehensive Care Center in Lexington, Kentucky. Her interests include dialectical behavior therapy and working with individuals with a history of trauma.