Assessment
18(1) 11–26

DOI: 10.1177/1073191110386342
http://asm.sagepub.com
SAGE

Examination of the Factor Structure and Concurrent Validity of the Langer Mindfulness/Mindlessness Scale

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Abstract

Langer's theory of mindfulness proposes that a mindful person seeks out and produces novelty, is attentive to context, and is flexible in thought and behavior. In three independent studies, the factor structure of the Langer Mindfulness/Mindlessness Scale was examined. Confirmatory factor analysis failed to replicate the four-factor model and a subsequent exploratory factor analysis revealed the presence of a two-factor (mindfulness and mindlessness) solution. Study 2 demonstrated that the two factors assessed discrete constructs and were not merely products of acquiescence. Support was also found for a nine-item, one-factor model comprised solely of mindfulness items. On comparing models, Study 3 suggested the superiority of the one-factor mindfulness model. Finally, a preliminary investigation of the concurrent validity of the revised nine-item Langer Mindfulness/Mindlessness Scale is presented. The current article offers researchers a revised version of a mindfulness measure derived from a cognitive perspective.

Keywords

mindfulness, Ellen Langer, factor structure, self-report, concurrent validity

Mindfulness is perhaps most widely regarded as a secularized adaptation of Eastern Buddhist tradition. As a construct, mindfulness is commonly defined as moment-to-moment awareness without judgment (Thera, 1962) or "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (Kabat-Zinn, 1994, p. 4). Growing interest in mindfulness as a way to enhance medical and psychological theories and treatment has led to several attempts to operationalize and measure mindfulness based on an Eastern Buddhistic perspective. The measures include the Freiburg Mindfulness Inventory (FMI 30-item; Buchheld, Grossman, & Walach, 2001; FMI 14-item; Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006), the Mindfulness Attention and Awareness Scale (MAAS; Brown & Ryan, 2003), the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004), the Toronto Mindfulness Scale (TMS state version; Lau et al., 2006; TMS trait version; Davis, Lau, & Cairns, 2009), the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), the Cognitive and Affective Mindfulness Scale–Revised (CAMS-R; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007), the Southampton Mindfulness Questionnaire (SMQ; Chadwick et al., 2008), and the Philadelphia Mindfulness Questionnaire (PMQ; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008).

Although there is likely considerable overlap among the aforementioned measures because of their shared Eastern lineage, each measure is somewhat unique in terms of how mindfulness is conceptualized and which dimensions are emphasized. The MAAS, a unidimensional scale, purports to measure attention and awareness to present moment experiences. Similarly, the CAMS, FMI, and SMQ are all single-factor scales; however, they aim to capture other dimensions of mindfulness such as acceptance/nonjudgment, openness to negative experiences, and letting go. Several scales have been developed to measure components of mindfulness as separable factors. The PMQ was designed to assess present-moment awareness and acceptance as two distinct factors. Both the state and trait versions of the TMS were designed to reflect a two-component model of mindfulness (Bishop et al., 2004) and are composed of two factors: curiosity and decentering. The four-factor KIMS

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(Observe, Describe, Act with Awareness, and Accept without Judgment) is largely based the mindfulness skills taught in Dialectical Behavior Therapy (Linehan, 1993). The five-factor FFMQ (Nonreactivity, Observing, Acting with Awareness, Describing, and Nonjudging) was derived from 112 pooled items from the MAAS, FMI, KIMS, CAMS-R, and SMQ.

Mindfulness from a purely Western psychological perspective has a relatively young history as a construct pioneered by Ellen Langer (1989). Langer's conceptualization of mindfulness, which was conceived entirely within a cognitive information-processing framework, is defined

> [A]s a general style or mode of functioning through which the individual actively engages in reconstructing the environment through creating new categories or distinctions, thus directing attention to new contextual cures that may be consciously controlled or manipulated as appropriate. (Langer, 1989, p. 4)

This definition reflects four interrelated components that characterize Langer's (1989) conceptualization of mindfulness (a) novelty seeking (b) engagement (c) novelty producing, and (d) flexibility.

Novelty Seeking and Engagement are components of Langer's conceptualization of mindfulness that refer to one's orientation to their environment (Bodner & Langer, 2001). Novelty Seeking involves the tendency to have an open and curious orientation to one's environment. Novelty Seeking is facilitated by and contributes to Engagement or an individual's propensity to interact and actively attend to changes in the environment. Novelty Producing and Flexibility are components of mindfulness that refer to how one operates in one's environment (Bodner & Langer, 2001). An individual with a propensity toward Novelty Producing actively creates new categories rather than relying on previously constructed categories and distinctions (Langer, 1989). Flexibility refers to a mindful person's ability to view his or her experiences from multiple perspectives and to use feedback from the environment to make any necessary adaptations to his or her behavior.

Langer's conceptualization of mindfulness grew out of her work examining *mindlessness,* described as follows: "When in a mindless state, an individual operates much like a robot; thoughts, emotions, and behaviors (hereafter just behaviors) are determined by 'programmed' routines based on distinctions and associations learned in the past" (Bodner & Langer, 2001, p. 1). Langer theorizes that mindlessness is often a consequence of premature cognitive commitments or the tendency to apply previously formed mindsets to current situations, which lock individuals into a repetitive unelaborated approach to daily life. Langer states that the most significant effect of mindlessness is the role it plays in stunting our creativity and overall potential. "Mindlessness, as it diminishes our self-image, narrows our choices, and weds us to single-minded attitudes, has a lot to do with this wasted potential." (Langer, 1989, p. 55).

Despite Langer's acknowledgment that both Eastern and Western conceptualizations of mindfulness appear to share "strikingly similar" qualities, she wrote that, "not being fully trained in Eastern thought, I leave it to others to tease out the similarities and differences between the two concepts of mindfulness" (Langer, 1989, p. 79). The degree to which Langer's conceptualization of mindfulness maps onto Eastern conceptualizations of mindfulness remains an empirical question; the answer to which relies on our ability to measure Langer's mindfulness construct.

Langer's Mindfulness/Mindlessness Scale

Over the past 25 years, tenants of Langer's theory of mindfulness have been examined by employing novel research paradigms designed to elicit mindful processing. More recently, Langer developed the Mindfulness/Mindlessness scale (MMS; Bodner & Langer, 2001), a rationally derived, 21-item 4-factor (Novelty Seeking, Engagement, Flexibility, and Novelty Producing), self-report questionnaire. Bodner and Langer (2001) examined the factor structure of the MMS in a pooled sample of 952 undergraduate students and community members. An initial confirmatory factor analysis (CFA) confirmed that all items related positively to a single factor (Cronbach's α = .28-.69). The authors reported two fit indices, the goodness-of-fit index (GFI = .95) and the root mean square of approximation (RMSEA = .07), indicating adequate fit of a single factor to the data. Next, a CFA was conducted to examine whether the four-factor theoretical model fit the data, which resulted in the following fit indices: GFI = .97 and RMSEA = .057. Finally, the results of a second-order single-factor CFA provided further evidence of a single dominant factor underlying the 21 items and 4 indicator domains (GFI = .998, RMSEA = .031). Cronbach's alpha for the pooled covariance matrix for the single factor was .85. The Cronbach's alpha for the Flexibility, Novelty Producing, Engagement, and Novelty Seeking scales were .54, .83, .63, and .74, respectively (Bodner & Langer, 2001).

In the same study, Bodner and Langer (2001) demonstrated construct validity through concurrent associations with theoretically related constructs. Specifically, the MMS was shown to correlate positively with the ability to view situations from multiple perspectives, liberal thinking style, openness to experience, need for cognition, and general cognitive ability. Last, the MMS showed a negative correlation with the need for structure.

Although Bodner and Langer (2001) presented data suggesting a good fit between the model and the data, two of the four indicator scales, flexibility and engagement, demonstrated inadequate internal consistency of .54 and .63,

respectively. In addition, we are aware of only one study that provided convergent validity by demonstrating that the MMS was associated with the MAAS, an eastern measure of mindfulness (Brown &Ryan, 2003). Bodner and Langer (2001) acknowledged that additional validation was warranted; however, to our knowledge, the MMS has not been the focus of any additional psychometric studies.

The primary aim of this set of studies was to provide psychometric validation for the MMS (Bodner & Langer, 2001) given its importance as the only measure developed to reflect a Western cognitive theory of mindfulness. Study 1 sought to validate the factor structure of the MMS by providing evidence for a robust and replicable factor structure in an independent sample. Study 2, sought to address the issues with the factor structure evaluated in Study 1 by examining two revised models in a new sample. Study 3, sought to establish the stability and overall superiority of one of the two remaining revised MMS models in two new samples.

The secondary aim of this set of studies was to examine the convergent and discriminant validity of the MMS. Insofar as research has shown associations between Eastern conceptualizations of mindfulness and select clinically oriented variables, Study 2 and 3 sought to examine the MMS in relation to affect, depression, anxiety, worry, and ruminative brooding, curiosity, and emotion regulation (Baer et al., 2004; Brown & Ryan, 2003; Hayes & Feldman, 2004). Predictions regarding how the MMS is expected to relate to the selected constructs are discussed in more detail in the introduction sections of Studies 2 and 3.

Study 1

Given the initial validation of the factor structure of the MMS (Bodner & Langer, 2001), the primary goal of the Study 1 was to validate this structure in an independent sample. It was hypothesized that the factor structure of the MMS would be replicated in the current sample.

Method

As part of a larger research study, university undergraduates (N = 582; 401 women; 181 men; mean age = 19.06 years, SD = 3.5) were recruited from general psychology classes to participate in a questionnaire session to fulfill a class requirement. The sample was 89.1% Caucasian, 4.3% African American, 0.7% Asian American, 0.8% Hispanic, 1.7% other, and 3.6% missing. Each participant provided demographic information and completed the MMS (Bodner & Langer, 2001).

Measures

Mindfulness. The MMS (Bodner & Langer, 2001) is a 21-item, 4-factor (Novelty Seeking, Novelty Producing, Engagement, and Flexibility) self-report questionnaire that assesses an individual's tendency to be mindful. Mindfulness is assessed using a 7-point Likert-type scale, ranging from 1 = *strongly disagree* to 7 = *strongly disagree* with 8 reverse-scored items. The MMS is scored such that higher total scores correspond with an increased propensity to be mindful. Cronbach's alpha for the MMS total score was .81 whereas Cronbach's alpha for the flexibility, novelty producing, engagement, and novelty seeking scales were .47, 63, .52, and .65 respectively. Item-level means and standard deviations for the MMS for each sample are presented in Table 1.

Data Analysis

Examination of the data set revealed that 91.72% of the participants' responses had no missing data points. To permit inclusion of data from all participants in the CFA procedures, missing values were imputed using an expectation-maximization (EM) imputation algorithm. EM imputation has been found to yield better estimates of missing data points than many other commonly used procedures (e.g., mean imputation, regression imputation; Bentler, 2004), leading to more accurate standard errors. EM imputation was also used in Studies 2 and 3 where 85.52% to 91.87% of the participants' responses had no missing data points.

The results of the initial CFA analyses are presented in Table 2. Mardia's statistic (average value of 89.22 in the model being tested) indicated significant violations of the assumptions of normally distributed data in structural equation modeling (Satorra & Bentler, 1994) as was the case with all of the models examined in Studies 2 and 3. Therefore, all structural models were refit using robust variances to obtain Satorra–Bentler scaled fit indices, which are corrected fit indices used to more accurately calculate the significance of a model employing nonnormal data (Satorra & Bentler, 1994). Chi-square is the most widely used summary statistic for examining the adequacy of a structural equation model, however, it is likely to overestimate the lack of fit, especially when the sample size is large (Bollen, 1989). In response to problems interpreting chi-square, Hu and Bentler (1999) highlight various fit indices that have been developed to complement the chi-square statistic to demonstrate converging evidence that the model fits the data well. For the Comparative Fit Index (CFI; Bentler, 1990), values between the ranges of .90 and .95 are considered acceptable and greater than .95 are considered indicative of good fit (Hu & Bentler, 1999). In addition, RMSEA values "close to 0.06" (Hu & Bentler, 1999, p. 1) and standardized root mean squared residual (SRMR) values "close to 0.08" (Hu & Bentler, 1999, p. 1) are considered to reflect adequate model fit. When reporting RMSEA, the common convention is to report the 90% confidence interval (CI), or the values between which 90% of all estimates of the RMSEA are likely to fall. The final fit index considered in the current

Table 1. Mindfulness/Mindlessness Scale (MMS) Means and Standard Deviations

	Mean (*SD*)				
Item	Study 1, Sample 1	Study 2, Sample 1	Study 3, Sample 1 Time 1	Study 3, Sample 1 Time 2	Study 3, Sample 2
MMS 1	5.23 (1.37)	5.04 (1.36)	5.26 (1.26)	5.37 (1.36)	5.14 (1.38)
MMS 2[a]	3.60 (1.54)	4.10 (1.35)	3.60 (1.52)	3.48 (1.61)	3.38 (1.50)
MMS 3	5.11 (1.42)	5.12 (1.16)	5.0 9 (1.43)	5.27 (1.17)	4.91 (1.43)
MMS 4	4.89 (1.42)	4.89 (1.23)	4.63 (1.32)	4.83 (1.32)	4.81 (1.35)
MMS 5[a]	2.99 (1.48)	4.66 (1.33)	2.43 (1.47)	2.42 (1.37)	2.69 (1.52)
MMS 6	4.05 (1.43)	4.27 (1.23)	4.26 (1.34)	4.49 (1.41)	4.47 (1.34)
MMS 7[a]	3.76 (1.46)	4.16 (1.30)	3.5 (1.49)	3.64 (1.47)	3.81 (1.47)
MMS 8[a]	2.79 (1.53)	4.72 (1.34)	2.37 (1.41)	2.64 (1.43)	2.56 (1.48)
MMS 9[a]	2.48 (1.45)	4.78 (1.47)	2.29 (1.54)	2.36 (1.36)	2.42 (1.49)
MMS 10	5.28 (1.45)	4.91 (1.43)	5.06 (1.51)	5.17 (1.64)	5.20 (1.57)
MMS 11	5.48 (1.29)	4.93 (1.23)	5.47 (1.22)	5.31 (1.40)	5.44 (1.32)
MMS 12	5.07 (1.22)	4.8813 (1.14)	5.08 (1.26)	5.13 (1.33)	4.85 (1.36)
MMS 13	5.68 (1.16)	5.2677 (1.23)	5.40 (1.17)	5.48 (1.29)	5.58 (1.25)
MMS 14	5.06 (1.27)	4.9361 (1.29)	4.88 (1.34)	5.01 (1.20)	4.96 (1.28)
MMS 15[a]	2.63 (1.41)	4.6498 (1.36)	2.30 (1.27)	2.37 (1.24)	2.49 (1.35)
MMS 16	4.77 (1.54)	4.6791 (1.40)	4.78 (1.68)	4.89 (1.52)	4.70 (1.74)
MMS 17	4.76 (1.45)	4.7070 (1.33)	5.43 (1.42)	5.45 (1.27)	4.97 (1.57)
MMS 18	4.58 (1.39)	4.5771 (1.21)	4.43 (1.38)	4.76 (1.33)	4.55 (1.38)
MMS 19[a]	3.01 (1.41)	4.4746 (1.30)	2.57 (1.25)	2.60 (1.23)	2.60 (1.36)
MMS 20	4.77 (1.58)	4.8190 (1.37)	5.05 (1.49)	5.21 (1.33)	5.06 (1.48)
MMS 21[a]	2.84 (1.49)	4.6762 (1.40)	2.86 (1.50)	2.63 (1.47)	2.65 (1.51)

[a] These items should be reverse scored.

Table 2. Goodness-of-Fit Indices of Models for the Mindfulness/Mindlessness Scale (Study 1, Sample 1, $N = 582$; Study 2, Sample 2, $N = 457$)

Model	χ^2	*df*	CMIN/*df*	CFI	SRMR	RMSEA	90% CI on RMSEA
Study 1, Sample 1							
Mindfulness/Mindlessness Scale	948.70***	183	5.18	.64	.12	.085	0.08-0.09
Study 2, Sample 2							
Mindfulness/Mindlessness Scale two-factor	260.80***	103	2.53	.90	.06	.06	0.05-0.07
Mindfulness/Mindlessness Scale two-factor (with post hoc modifications)	107.41***	63	1.70	.96	.04	.04	0.03-0.05
Difference between two-factor models	153.39***	40	—	—	—	—	—
Methods model two-factors	238.95***	99	2.41	.91	.05	.06	0.05-0.07
Methods model two-factors (with post hoc modifications)	102.79***	60	1.71	.96	.04	.04	0.03-0.05
Methods model one-factor	288.13***	64	4.5	.81	.09	.09	0.08-0.10
Mindfulness/Mindlessness Scale one-factor	55.65***	26	2.14	.97	.04	.05	0.03-0.07
Difference between two-factor model and one-factor model	51.76***	37	—	—	—	—	—

Note: CMIN/*df* = final fit index; CFI = comparative fit index; SRMR = standardized root mean squared residual; RMSEA = root mean square error of approximation; CI = confidence interval. All values are rounded to two decimal places. Values >.90 for the CFI indicate a reasonable fit, whereas those >.95 suggests a good fit. Values <.05 for the RMSEA indicate a good fit, and values between .05 and .08 for the RMSEA indicate a reasonable fit. Values ≤.08 for the SRMR indicate a good fit (Hu & Bentler, 1999).
*$p < .01$. **$p < .05$.

study is the CMIN/*df* statistic, a modification of the χ^2 statistic intended to reduce the tendency for χ^2 to be conflated by large sample sizes (Bollen, 1989). The CMIN/*df* is calculated simply by dividing χ^2 by the degrees of freedom for the overall model. Values of CMIN/*df* less than 3 to 4 are considered to reflect a good fit of the model to the data.

Table 3. Mindfulness/Mindlessness Scale (MMS) Item-Factor and Factor-Scale Loadings for Study 1, Sample 1

	Study 1, Sample 1	
Item	Factor 1	Factor 2
Factor 1 (Mindfulness)		
MMS 14: I try to think of new ways of doing things.	.67	–.03
MMS 18: I find it easy to create new and effective ideas.	.64	.00
MMS 3: I am always open to new ways of doing things.	.59	–.08
MMS 13: I am very curious.	.57	.01
MMS 10: I am very creative.	.57	.02
MMS 20: I like to figure out how things work.	.57	.03
MMS 17: I like to be challenged intellectually.	.56	.08
MMS 1: I like to investigate things.	.54	.07
MMS 4: I "get involved" in almost everything I do.	.47	.04
MMS 12: I attend to the "big picture."	.47	–.02
MMS 16: I have an open mind about everything, even things that challenge my core beliefs.	.44	–.14
Factor 2 (Mindlessness)		
MMS 15: I am rarely aware of changes. (R)	–.09	.69
MMS 19: I am rarely alert to new developments. (R)	.02	.60
MMS 8: I seldom notice what other people are up to. (R)	–.14	.57
MMS 9: I avoid thought provoking conversations. (R)	.13	.50
MMS 21: I am not an original thinker. (R)	.22	.42
Items that do not load on either factor		
MMS 2: I generate few novel ideas.	–.02	.26
MMS 5: I do not actively seek to learn new things.	.22	.24
MMS 6: I make many novel contributions.	.30	.11
MMS 7: I stay with the old tried and true ways of doing things.	.16	.11
MMS 11: I can behave in many different ways for a given situation.	.39	–.02

Results

The four-factor model proposed by Bodner and Langer (2001) yielded a significant chi-square statistic, $\chi^2(183) = 948.70$, $p = .000$, which was indicative of poor fit. Based on additional cut off guidelines suggested by Hu and Bentler (1999), the original four-factor model demonstrated a poor fit to the data, $\chi^2(183) = 948.70$, $p = .000$; CMIN/$df = 5.18$; CFI = .64; SRMR = .12; RMSEA = .09; 90% CI on RMSEA = .08-.09). An attempt was made to improve the fit of the original four-factor model via the use of modification indices supplemented by relevant theory (e.g., items deemed particularly representative of the underlying construct would not be deleted). However, it became clear that simple, theory-guided alterations of this model would be insufficient to adequately improve model fit. As a result, an exploratory factor analysis (EFA) using maximum likelihood estimation with oblique rotation[1] was performed. Examination of the scree plot and eigenvalues suggested the presence of two underlying factors. A second EFA was therefore conducted, with the additional constraint that only two factors be extracted. Individual items were considered to load on a factor if the factor loading exceeded .40 and if the difference in factor loadings between factors was greater than .20 (Gorsuch, 1983). Factor loadings for all items are shown in Table 3. Factor 1, with an eigenvalue 4.83 representing 23% of the variance, consisted of 11 positively worded items and was labeled *Mindfulness*. Inspection of the content of the items comprising the Mindfulness factor indicated that it adequately represented the various facets of Bodner and Langer's concept of mindfulness: engagement with the world, flexibility, and seeking out and creating novel experiences. Factor 2, with an eigenvalue of 2.25 representing 10.72% of the variance, consisted of five reverse-worded items and was labeled *Mindlessness*. Inspection of the content of the items comprising the Mindlessness factor indicated that it represented a lack of awareness of the world and avoidance of novelty, mapping well onto Bodner and Langer's concept of mindlessness. The remaining five items from the original pool of 21 items were dropped from further analysis because they either failed to load on either factor or loaded equally on both factors.

Discussion

Study 1 sought to replicate the Bodner and Langer's (2001) four-factor model of the MMS. The present findings failed

to replicate the initial four-factor model. Subsequent EFAs suggest a two-factor model comprised of an 11-item mindfulness factor and five reverse-scored items reflecting a mindlessness factor.[2]

Study 2

In the second study, two competing models of the factor structure for the MMS were evaluated in a new sample. CFAs were conducted to examine the fit of a two-factor model comprised of a mindfulness factor and a mindlessness factor versus a one-factor model comprised of positively worded mindfulness items.

A secondary aim of the current study was to examine the relationships between the MMS and self-report measures of depression and anxiety symptoms, worry, and ruminative brooding.

We hypothesized that that the MMS mindfulness factor would be negatively associated with depression and anxiety whereas the mindlessness factor would be positively associated with measures of depression and anxiety.

Ruminative brooding refers to the tendency to repetitively focus on a negative event or stimulus, and negatively affects the onset, severity, and duration of depressive symptoms (Nolen-Hoeksema, 1998). Langer's characterization of mindlessness as an inflexible reliance on previously defined ways of thinking is likely overlaps with the tendency to engage in repetitive negative thinking. In contrast, a ruminative response style appears to be unlike Langer's definition of mindfulness, which involves the act of creating new categories and perceiving situations from more than one perspective. Thus it is hypothesized that rumination would be negatively related to mindfulness and positively associated with mindlessness.

Worry is conceptualized to be a relatively uncontrollable cascade of negative thoughts that usually occurs when an uncertain issue has one or more possible negative outcomes (Borkovec, Robinson, Pruzinsky, & DePree, 1983). A major aspect of Langer's conceptualization of mindfulness is a present-tense orientation to the environment, which likely precludes an anxious focus on the future. Therefore, it is hypothesized that worry would be positively related to mindlessness and unrelated to mindfulness.

Method

Participants. As part of a larger research study, a second sample of university undergraduates ($N = 457$; 273 female; 182 male; 2 missing; mean age = 22.99 years, $SD = 9.86$) were recruited from general psychology classes to participate in a questionnaire session to fulfill a class requirement. The sample was 83.8% Caucasian, 11.8% African American, 0.4% Asian American, 0.4% Hispanic, 3.1% Other, and 0.4% missing. Each participant provided demographic information and completed the MMS as well as concurrent validity measures assessing depression and anxiety symptoms, worry, and depressive rumination.

Measures

Mindfulness. Participants completed the MMS (Bodner & Langer, 2001) that was used in Study 1. In this sample, Cronbach's alpha for the MMS total score was .86 whereas Cronbach's alpha for the flexibility, novelty producing, engagement, and novelty seeking scales were .51, .63, .60, and .73, respectively.

Depression and anxiety symptoms. The Mood and Anxiety Symptom Questionnaire–Short Form (MASQ-SF; Watson & Clark, 1991) is a 62-item measure assessing symptoms that commonly occur in the mood and anxiety disorders. The MASQ-SF is composed of four subscales; however, only the two subscales shown to differentiate between symptoms of depression (anhedonic depression subscale: AD) and anxiety (anxious arousal subscale: AA) were included in the analyses. The AA subscale is composed of 17 items assessing anxiety-specific symptoms of somatic tension and hyperarousal (e.g., "Startled easily"; "Was trembling or shaking"). The AD subscale consists of 22 items assessing symptoms relatively specific to depression, such as loss of pleasure in usual activities, disinterest, low energy (e.g., "Felt like nothing was very enjoyable") and reverse-keyed items assessing positive emotional experiences (e.g., "Felt cheerful"). Items are rated by how often symptoms were experienced in the past week on a Likert-type scale ranging from 1 (*not at all*) to 5 (*extremely*). The MASQ–short form has demonstrated high levels of internal consistency for each of the subscales in student samples (all αs $\geq$.78), a community sample (all αs $\geq$.78), and one patient sample (all αs $\geq$.86; Watson et al., 1995). In this sample, Cronbach's alphas for the AA and AD subscales were .88 and .90, respectively.

The Beck Depression Inventory–II (BDI-II; Beck, Steer, & Brown, 1996) is a 21-item self-report measure that assesses the affective, cognitive, behavioral, and somatic symptoms of depression as well as motivational components and suicidal wishes. Items reflect a 2-week time period and are rated on a 4-point scale. The BDI-II has demonstrated good internal consistency (α = .91; Beck, Steer, Ball, & Ranieri, 1996) and high test–retest reliability over a 1-week period (r = .93; Beck, Steer, & Brown 1996). Cronbach's alpha for the BDI-II total score was .9 in the current sample.

Worry. The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) contains 16 items rated on a 1 to 5 scale and assesses the extent to which worry is excessive, uncontrollable, and pervasive (e.g., "My worries overwhelm me"; "I worry all the time"). The items are rated on a Likert-type scale, 1 being *not at all typical of*

Table 4. Mindfulness/Mindlessness Scale (MMS) Item-Factor and Factor-Scale Loadings for Study 2, Sample 1

	Study 2, Sample 1			
Item	Two-Factor Mindful/ Mindless	Two-Factor Methods	One-Factor Methods	One-Factor Mindful
Factor 1 (Mindfulness)				
MMS 1: I like to investigate things.	.58	.58	.58	.58
MMS 3: I am always open to new ways of doing things.	.69	.69	.68	.70
MMS 4: I "get involved" in almost everything I do.	.60	.60	.60	.60
MMS 10: I am very creative.	.51	.52	.51	.51
MMS 12: I attend to the "big picture."	.59	.59	.58	.59
MMS 13: I am very curious.	.66	.66	.66	.66
MMS 14: I try to think of new ways of doing things.	.61	.62	.61	.61
MMS 17: I like to be challenged intellectually.	.63	.64	.63	.63
MMS 20: I like to figure out how things work.	.52	.53	.51	.53
Factor 2 (Mindlessness)				
MMS 15: I am rarely aware of changes. (R)	.58	.21	.27	N/A
MMS 19: I am rarely alert to new developments. (R)	.57	.14	.21	N/A
MMS 8: I seldom notice what other people are up to. (R)	.64	.24	.30	N/A
MMS 9: I avoid thought provoking conversations. (R)	.69	.31	.37	N/A

me, 5 being *very typical of me*. The PSWQ has demonstrated good internal consistency (α = .93) and test–retest reliability over periods as long as 8 to 10 weeks in a college undergraduate population (Meyer et al., 1990). Cronbach's alpha for the current sample was .93.

Depressive rumination. The Response Styles Questionnaire (RSQ; Nolen-Hoeksema, 1991) is a self-report questionnaire that assesses the individuals' tendencies to ruminate in response to their symptoms of negative emotion. Only 25 items from the Ruminative Response Scale of the RSQ were administered. Values range from 1 (*almost never*) to 4 (*almost always*). The Ruminative Response Scale consists of two factors (brooding and pondering); however, only the brooding subscale (i.e., "Go away by yourself and think about why you feel this way") was analyzed in the current sample. Cronbach's alpha for the RSQ brooding subscale was .87.

Data Analysis

Since EFA in Study 1 suggested that a two-factor solution fit the data, follow-up CFAs were conducted in the current study. The first CFA examined the fit of a correlated two-factor model with distinct mindfulness and mindlessness first-order factors. The second analysis examined a two-factor methods model and last, an alternative one-factor mindfulness model was also tested.

A series of zero-order correlations and tests of dependent correlations were computed to evaluate the relationships between the mindfulness and mindlessness factors, anxiety, depression, worry, and ruminative brooding.

Results

The two-factor model yielded the following fit indices: $\chi^2(103) = 260.80$, $p < .001$; CMIN/df = 2.53; CFI = .90; SRMR = .06; RMSEA = .06; 90% CI on RMSEA = .05-.07. Both factors were significantly correlated with one another ($r = .40$, $p < .05$). Factor loading for all items are presented in Table 4.

Post hoc model modifications were performed in an attempt to improve model fit. The error terms of two items (Item 17, "I like being challenged intellectually" and Item 20, "I like to figure out how things work") were allowed to correlate. This modification was made both because of the overlapping nature of the item content and based on recommendations to improve model fit given by the LeGrange multiplier test. In addition, three items (Item 16, "I have an open mind about everything, even things that challenge my core beliefs," Item 18, "I find it easy to create new and effective ideas," and Item 21, "I am not an original thinker") were dropped from the model as they contributed poorly to model fit as evidenced by the Lagrange multiplier test. Results indicated that these items cross-loaded on both factors and so were dropped to ensure that each item was a pure indicator of only one latent variable.

The modified two-factor model yielded the following fit indices: $\chi^2(63) = 107.41$, $p < .001$; CMIN/df = 1.70; CFI = .96; SRMR = .04; RMSEA = .04; 90% CI on RMSEA = .08-.05 (see Table 3 for a list of factor loadings for all retained items). Again, both factors were significantly correlated with one another ($r = .38$, $p < .05$).

Table 5. Sample Means, Standard Deviations, Zero-Order Correlations, and Tests of Dependent Correlations Comparing Mindfulness and Mindlessness Factors to Symptom Measures and Measures of Negative Thinking in Study 2

Variable	Mean (*SD*)	Mindfulness Factor	Mindlessness Factor	Difference a Versus b	
				t(432)	*d*
BDI	9.94 (7.91)	–.07	.07	0	0
MASQ-AA	25.05 (8.03)	–.03	.14**	1.80**	.17
MASQ-AD	55.76 (10.37)	–.23**	.17**	1.02	.10
RSQ-Brooding	9.97 (3.41)	–.09	.11*	.35	.03
PSWQ	49.15 (12.74)	–.05	.07	.32	.03

Note: BDI = Beck Depression Inventory; MASQ-AA = Mood and Anxiety Symptom Questionnaire–Anxious Arousal Subscale; MASQ-AD = Mood and Anxiety Symptom Questionnaire–Anhedonic Depression Subscale; RSQ-Brooding = Ruminative Response Scale–Brooding Subscale; PSWQ = Penn State Worry Questionnaire. $N = 435$ for BDI and MASQ.
*$p < .05$. **$p < .01$.

Finally, an alternative one-factor model, containing only positively worded mindfulness items, was estimated. The one-factor mindfulness model yielded the following fit indices: χ^2 [26] = 55.65, $p < .001$; CMIN/df = 2.14; CFI = .97; SRMR = .04; RMSEA = .05; 90% CI on RMSEA = .03-.07.

Reliability. The internal consistency was estimated for the mindfulness factor and the mindlessness factor. Cronbach's alpha for the nine-item mindfulness factor and the four-item mindlessness factor was .83 and .72, respectively.

Relationship of mindfulness to depression and anxiety symptoms. As shown in Table 5, the mindfulness and mindlessness factors were inconsistently related to measures of mood and repetitive thought. The mindfulness factor was significantly and negatively correlated with anhedonic depression as measured by the MASQ-AD; however, unrelated to depression as measured by the BDI-II. Similarly, the mindlessness factor was unrelated to depression as measured by the BDI-II; however, significantly and positively correlated with both depression and anxiety as measured by the MASQ-AD and MASQ-AA. A test of the dependent correlations revealed that the mindlessness factor was significantly more related to anxiety as measured by the MASQ-AA than the mindfulness factor, although this finding falls below Cohen's (1988) conventions for a small effect size.

Relationship of mindfulness to ruminative brooding and worry. With regard to negative repetitive thought, the mindlessness factor was significantly correlated with ruminative brooding and unrelated to worry, as shown in Table 5. The mindfulness factor was unrelated to worry or ruminative brooding. There were no significant differences between the mindfulness factor and the mindlessness factor in their relationships with ruminative brooding and worry.

Discussion

The primary goal of Study 2 was to compare two competing models underlying the mindfulness/mindlessness scale. The initial mindfulness/mindlessness two-factor model failed to fit the data; however, with post hoc modifications, based on statistical diagnostics and relevant theory, the model fit the data well. Finally, a CFA of an alternative one-factor model comprising positively worded mindfulness items was conducted. The model fit the data well and had comparable fit to the two-factor mindfulness/mindlessness model. To determine which model is superior, past research suggests examining both the chi-square difference test and the CFI for nested models (Cheung & Rensvold, 2002). The chi-square difference test indicated a significant difference between the two-factor model and one-factor model, $\Delta\chi^2(37) = 51.76$, $p < .000$. Examination of the CFI index for each model suggests that the one-factor model (CFI = .97) is superior to the two-factor model (CFI = .96).

The secondary goal of Study 2 was to determine convergent validity by examining the relationship of the mindfulness and mindlessness factors to depression, anxiety, worry, and ruminative brooding. Mixed support was found for the predicted relationships between mindfulness, mindlessness, and mood. Neither the mindfulness nor mindlessness factors were correlated with depression as measured by the BDI-II. However, the mindfulness was significantly negatively related to anhedonic depression, whereas the opposite pattern of association was found for the mindlessness factor. Similarly, mindlessness was significantly related to anxiety whereas the mindfulness factor was unrelated to anxiety. The mindlessness factor was also significantly more related to anxiety than the mindfulness factor, although this finding falls below Cohen's conventions for a small effect size. With respect to negative repetitive thought, the mindlessness factor was significantly and positively associated with ruminative brooding. Mindfulness was unrelated to ruminative brooding and mindfulness factor was not related to worry. Finally, there were no significant differences between the mindfulness factor and the mindlessness factor in their relationships with ruminative brooding and worry.

Study 3

In Study 3, the fit of a two-factor and a one-factor model were compared in two additional samples to confirm the stability of these models. In addition, the current study sought to examine the relationship of the final model to symptom measures, emotion regulation, and openness to experience to provide supplemental validity to the model. Various lines of research have demonstrated that the strategies we employ to regulate our emotions have great implications for mental health. Gross and John (2003) have examined two emotion regulation strategies, cognitive reappraisal and suppression. Cognitive reappraisal occurs before one's emotions have become fully activated and involves reframing emotional events to change the emotional impact of the situation. Expressive suppression involves restraining emotional behavior that is currently underway. Greater use of reappraisal is associated with more positive and less negative emotions whereas the inverse is true for suppression (Gross & John, 2003). The executions of these emotion regulation strategies are theorized to occur automatically without much conscious deliberation or awareness. It is likely that individuals with a greater propensity to be mindful are more likely to use reappraisal to disengage from negative thinking patterns. In contrast, mindlessness is likely to be associated with suppression insofar as suppression reflects a divide between what one is feeling and what one actually expresses. As such, it was hypothesized that the propensity to be mindful as conceptualized by Langer (1989) would be positively related to reappraisal and negatively related to the suppression.

The Curiosity and Exploration Inventory (CEI; Kashdan, Rose, & Fincham, 2004) was developed to assess two separate components of curiosity. The first component, exploration, refers to the propensity to actively orient and pursue novel and challenging experiences. The second component, absorption, refers to one's engagement and investigative manipulation of these novel and challenging experiences. This construct is of relevance to the current study as Langer (1989, 1997) includes openness to experience in her model of mindfulness. Insofar as curiosity and mindfulness share overlapping properties, it was hypothesized that mindfulness would be related to the exploration and absorption subscales of the CEI.

Finally, we sought to evaluate the stability of the final model by investigating whether the model possessed structural invariance at two time points, 3 months apart. The traditional, test–retest correlation is useful for identifying mean change in a variable over time. In the context of a latent variable framework, a correlation would not be able to detect if the relationships between the indicators that compose a factor, change over time. It is for this reason that we have supplemented the traditional test–retest indicator of temporal stability with a latent variable modeling approach that is consistent with the analytical approach used throughout the manuscript.

Method

Participants. Participants were undergraduate psychology students at a large, public, Mid-Atlantic university. Students received research credit for participation. In Sample 1, students completed both an initial and 3-month follow-up survey. There were 148 students at Time 1 (T1) and 145 of them completed the 3-month follow-up survey at Time 2 (T2). The T2 sample was composed of 109 women and 36 men. The majority were Caucasian (69%), with the remaining defining themselves as Hispanic/ Hispanic American (6.3%), Asian/Asian American (5.6%), Middle Eastern (5.6%), African American (3.5%), Mixed or Other (7.7%), and 2.1% indicating "not applicable" or providing no response. The mean age was 23.18 (SD = 6.08).

In Sample 2, we recruited 306 undergraduate students (201 women, 105 men) enrolled in psychology courses at a medium-sized, public, Mid-Western university. Students received research credit for completing an initial survey. The majority of participants were Caucasian (94%), with a mean age of 21.16 years (SD = 2.78).

Procedure. In Samples 1 and 2, participants completed a confidential Internet-based survey (no personally identifying information). In Sample 1, students also received an email approximately 3 months after completing the initial survey at T1 with a web link to complete the follow-up survey at T2.

Measures

Mindfulness. Participants completed the MMS (Bodner & Langer, 2001) that was used in Studies 1 and 2. For Sample 1, Cronbach's alpha for the MMS total score was .84 whereas Cronbach's alphas for the flexibility, novelty producing, engagement, and novelty seeking scales were .45, 77, .46, and .66, respectively. For Sample 2, Cronbach's alpha for the MMS total score was .83 while Cronbach's alpha for the flexibility, novelty producing, engagement, and novelty seeking scales were .53, 72, .56, and .70, respectively.

Affect. The Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) is a 20-item questionnaire that assesses two orthogonal dimensions of mood: positive and negative affect. Respondents indicate the extent to which they have felt different feelings and emotions during the past few weeks using a 5-point Likert-type scale (ranging from *very slightly or not at all* to *extremely*). This measure has adequate internal consistency; coefficients alpha for the two scales are as follows: positive affect = .87; negative affect = .87. Both scales have shown evidence of internal and external validity as well (Watson et al., 1988). Cronbach's alphas for the positive and negative affect scales were .78 and .77, respectively.

Table 6. Goodness-of-Fit Indices of Models for the Mindfulness/Mindlessness Scale for Study 3, Sample 1, Time 1 (T1) and Time 2 (T2) and Sample 2

Model	χ^2	*df*	CMIN/df	CFI	ΔCFI	SRMR	RMSEA
Study 3–Sample 1							
T1 MMS 1-Factor (*N* = 143)	28.38	26	1.09	.99		.05	.03
T1 MMS 2-Factor (*N* = 143)	70.85	63	1.12	.97	.02	.07	.03
T2 MMS 1-Factor (*N* = 140)	27.25	26	1.05	1.0		.05	.02
T2 MMS 2-Factor (*N* = 140)	104.10	63	1.65	.90	.10	.08	.07
Study 3–Sample 2							
MMS 1-Factor (*N* = 286)	48.34	26	1.86	.93		.05	.06
MMS 2-Factor (*N* = 286)	106.38	63	1.69	.92	.01	.07	.05

Note: CMIN/*df* = final fit index; CFI = comparative fit index; SRMR = standardized root mean squared residual; RMSEA = root mean square error of approximation; CI = confidence interval. Values >.90 for the CFI indicate a reasonable fit, whereas those >.95 suggests a good fit. Values <.05 for the RMSEA indicate a good fit, and values between .05 and .08 for the RMSEA indicate a reasonable fit. Values ≤.08 for the SRMR indicate a good fit (Hu & Bentler, 1999). Values less than 3 to 4 for CMIN indicates a good fit. Values >.01 for ΔCFI indicate a significant difference between the two nested models.

Curiosity. The CEI (Kashdan et al., 2004) measures curiosity, conceptualized as a positive emotional–motivational system of cognitions that identifies, seeks out, and regulates novel and challenging opportunities. The scale was designed to assess the exploration or appetitive motivation and absorption theorized to reflect flow-like engagement, both components of curiosity. Studies have shown the exploration and absorption subscales have alpha coefficients that range from .72 to .80 (Kashdan et al., 2004). In Study 3, Sample 1, Cronbach's alphas for total score and the exploration and absorption scales were .67, .72 and .64, respectively. A similar degree of internal consistency was found for the CEI in Study 3, Sample 2. Cronbach's alphas for the total score and the exploration and absorption scales were 75, 70, and .63, respectively.

Emotion regulation. The Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) is a 10-item self-report questionnaire that assesses individual differences in the habitual use of two emotion regulation strategies: cognitive reappraisal and expressive suppression. The ERQ demonstrated adequate test–retest reliability (.69) for both subscales across 3 months and demonstrated good internal consistency for cognitive reappraisal (α = .79) and expression suppression (α = 0.73; Gross & John, 2003). In the current sample (Study 3, Sample 1) Cronbach's alpha for the reappraisal subscale was .84 and for the suppression subscale was .74.

Data Analysis

CFA was conducted with the two competing mindfulness models in Sample 1 (both T1 and T2) and Sample 2. Bivariate correlations were conducted to examine the relationship between the final model and measures of affect, emotion regulation, and openness to experience. Finally, multigroup CFA (MGCFA) was used in Sample 1 to determine if the final model represented the data equally well at both T1 and at T2. We sought to evaluate if the loadings of the various items composing the mindfulness factor were equal across time points and possessed what is known as structural invariance (Bollen, 1989).

Finally a series of zero-order correlations and tests of dependent correlations were computed to evaluate the relationships between the mindfulness and mindlessness factors, positive/negative affect, curiosity, and emotion regulation.

Results

In Sample 1—T1, the one-factor mindfulness model fit the data well, $\chi^2(26) = 28.38$, $p < .001$; CMIN/*df* = 1.09; CFI = .99; SRMR = .05; RMSEA = .03; 90% CI on RMSEA = .00-.07. Factor loadings for all items are shown in Table 6. The two-factor mindfulness model also fit the data well, $\chi^2(63) = 70.85$, $p < .001$; CMIN/*df* = 1.12; CFI = .97; SRMR = .07; RMSEA = .03; 90% CI on RMSEA = .00-.06. Similar to the results from Study 2, both factors were significantly correlated with one another ($r = .55$, $p < .05$). The change in CFI index suggests that there was a significant difference between the models (ΔCFI = .022) indicating that the one-factor model fit the data significantly better than the two-factor model.

In Sample 1—T2, the one-factor mindfulness model yielded the following fit indices: $\chi^2(26) = 27.25$, $p < .001$; CMIN/*df* = 1.05; CFI =1.0; SRMR = .05; RMSEA = .02; 90% CI on RMSEA = .00-.07. In comparison, the two-factor mindfulness model yielded the following fit indices: $\chi^2(63) = 104.10$, $p < .001$; CMIN/*df* = 1.65; CFI = .91; SRMR = .08; RMSEA = .07; 90% CI on RMSEA = .05-.09. Similar to the results from T1, both factors were significantly correlated with one another ($r = .57$, $p < .05$). The change in CFI index suggested that there was a significant

Table 7. Mindfulness/Mindlessness Scale (MMS) Item-Factor and Factor-Scale Loadings for Study 3

	Sample 1, Time 1		Sample 1, Time 2		Sample 2	
Item	Two-Factor	One-Factor	Two-Factor	One-Factor	Two-Factor	One-Factor
Factor 1 (Mindfulness)						
MMS 1: I like to investigate things.	.65	.65	.78	.80	.64	.64
MMS 3: I am always open to new ways of doing things.	.35	.35	.65	.65	.43	.43
MMS 4: I "get involved" in almost everything I do.	.50	.51	.67	.66	.43	.44
MMS 10: I am very creative.	.55	.56	.43	.44	.55	.55
MMS 12: I attend to the "big picture."	.19	.21	.63	.62	.46	.46
MMS 13: I am very curious.	.66	.67	.64	.63	.56	.56
MMS 14: I try to think of new ways of doing things.	.77	.77	.66	.64	.72	.73
MMS 17: I like to be challenged intellectually.	.52	.49	.61	.61	.50	.50
MMS 20: I like to figure out how things work.	.46	.47	.58	.57	.58	.57
Factor 2 (Mindlessness)						
MMS 15: I am rarely aware of changes. (R)	.57		.74		.81	
MMS 19: I am rarely alert to new developments. (R)	.63		.76		.69	
MMS 8: I seldom notice what other people are up to. (R)	.40		.55		.57	
MMS 9: I avoid thought provoking conversations. (R)	.43		.44		.38	

difference between the models (ΔCFI = .083) indicating that the one-factor model fit the data significantly better than the two-factor model.

In Sample 2, the one-factor mindfulness/mindlessness model yielded the following fit indices: $\chi^2(26) = 48.34$, $p < .001$; CMIN/df = 1.86; CFI = .93; SRMR = .05; RMSEA = .06; 90% CI on RMSEA = .03-.08. Factor loadings for all items for each CFA are shown in Table 7.

In comparison, the two-factor mindfulness/mindlessness model yielded the following fit indices: $\chi^2(63) = 106.38$, $p < .001$; CMIN/df = 1.69; CFI = .92; SRMR = .07; RMSEA = .05; 90% CI on RMSEA = .03-.07. Consistent with prior findings, both factors were significantly correlated with one another ($r = .20$, $p < .05$).The change in CFI index suggested that there was a small but significant difference between the models (ΔCFI = .011) indicating that the one-factor model fit the data significantly better than the two-factor model.

Reliability. The internal consistency was estimated for the one-factor mindfulness model in both samples. Cronbach's alphas for the nine-item mindfulness factor in Sample 1–T1 and T2 were .76 and .85, respectively. In Sample 2, Cronbach's alpha for the nine-item mindfulness factor was .79.

Concurrent validity. The previous analyses suggest that a one-factor mindfulness model fit the data better than the two-factor model and should be adopted to reflect a version of the Langer Mindfulness scale replicable factor structure. The current set of analyses sought to examine the relationship of the one-factor mindfulness model to affect, openness, and emotion regulation. To maximize the interpretability of the results, the relationship of the mindlessness factor to affect, openness, and emotion regulation was also examined. These conceptually relevant measures were collected concurrently to the MMS. See Table 8 for descriptive statistics.

Relationship of Mindfulness and Mindlessness to Affect. As shown in Table 9, the mindfulness and mindlessness factors were not consistently related to affect. The mindfulness factor was positively correlated with positive affect at T1 and T2. The mindfulness factor unrelated to negative affect at T1; however, negatively related to negative affect at T2. The mindlessness factor was negatively correlated with positive affect at T1 and T2. The mindlessness factor was unrelated to negative affect at T1; however, it was positively correlated with negative affect at T2.

Relationship of Mindfulness and Mindlessness to Emotion Regulation and Curiosity. As predicted, the mindfulness factor was positively correlated with reappraisal; however, in contrast with predictions, the mindfulness factor unrelated to suppression (see Table 9). Mindlessness was not consistently related to reappraisal and suppression at T1 and T2. At T1, but not at T2, mindlessness was positively correlated with suppression. At T1, mindlessness was negatively correlated with reappraisal; however, it was unrelated to reappraisal at T2.

Relationship of Mindfulness and Mindlessness to Curiosity. In line with predictions, the mindfulness factor was positively correlated with curiosity total score, and the exploration and absorption subscales at all time points. Similarly, the mindlessness factor was negatively correlated with the curiosity total score and the exploration subscale; however, contrary to predictions, the mindlessness factor was unrelated to the absorption subscale.

Table 8. Sample Means (Standard Deviations) and Zero-Order Correlations Comparing the Mindfulness and Mindlessness Factors to Measures of Affect, Openness to Experience, and Emotion Regulation for Study 3

	Mean (*SD*)		
Variable	Sample 1, Time 1	Sample 1, Time 2	Sample 2
PANAS			
Positive affect	3.25 (0.58)	3.29 (0.61)	
Negative affect	2.30 (0.61)	2.16 (0.59)	
CEI			
Total score	32.62 (6.05)	33.72 (6.28)	32.23 (6.73)
Exploration subscale	20.03 (4.08)	20.77 (4.14)	19.38 (4.21)
Absorption subscale	13.14 (3.08)	13.96 (3.07)	13.75 (3.42)
ERQ			
Reappraisal subscale	27.52 (7.00)	28.03 (7.20)	
Suppression subscale	12.74 (4.89)	12.73 (5.14)	

Note: PANAS = Positive and Negative Affect Schedule (Time 1, *N* = 145; Time 2, *N* = 145); CEI = Curiosity and Exploration Inventory (Time 1, *N* = 143; Time 2, *N* = 142; Sample 2, *N* = 292); ERQ = Emotion Regulation Questionnaire (Time 1, *N* = 145; Time 2, *N* = 143. One-Factor Mindfulness Model (Time 1, *N* = 143; Time 2, *N* = 135; Sample 2, *N* = 271).

Table 9. Zero-Order Correlations Comparing the Mindfulness and Mindlessness Factors to Measures of Affect, Openness to Experience, and Emotion Regulation for Study 3

	Sample 1, Time 1		Sample 1, Time 2		Sample 2	
Variable	Mindfulness Factor	Mindlessness Factor	Mindfulness Factor	Mindlessness Factor	Mindfulness Factor	Mindlessness Factor
PANAS						
Positive affect	.36***	–.29**	.36***	–.22**		
Negative affect	–.01	.09	–.19*	.24**		
CEI						
Total	.59***	–.27**	.76***	–.32***	.63***	–.22***
Exploration	.58***	–.31***	.77***	–.36***	.60***	–.25***
Absorption	.44***	–.10	.63***	–.15	.55***	–.11
ERQ						
Reappraisal	.32***	–.12	.33***	–.26**		
Suppression	–.12	.24**	–.01	.15		

Note: PANAS = Positive and Negative Affect Schedule (Time 1, *N* = 145; Time 2, *N* = 145); CEI = Curiosity and Exploration Inventory (Time 1, *N* = 143; Time 2, *N* = 142; Sample 2, *N* = 292); ERQ = Emotion Regulation Questionnaire (Time 1, *N* = 145; Time 2, *N* = 143).
*$p < .05$. **$p < .01$. ***$p < .001$.

Structural Invariance. MGCFA was used to determine if the one-factor model represented the data well in Sample 1 at T1 and at T2. We sought to evaluate if the loadings of the various items composing the mindfulness factor were equal across time points and possessed what is known as structural invariance (Bollen, 1989). Testing structural invariance involves first estimating a model where all factor loadings are constrained to be equal across the two groups being compared (in this case, T1 and T2). This model is then compared with one or more alternative models where the factor loading(s) of each item is unconstrained and allowed to be freely estimated. Differences in goodness of fit between the constrained and the unconstrained models indicate a lack of structural invariance, or that the item-factor loadings are unequal across groups. Cheung and Rensvold (2002) suggest that a difference in CFI (ΔCFI) greater than .01 is indicative of an item not loading equally between groups. Seven of nine values of ΔCFI fell below this cut-off, indicating that the unifactorial mindfulness model fit both T1 and T2 equally well. Two of the nine values (Item 12, "I attend to the 'big picture'"; and Item 14, "I try to think of new ways of doing things") fell below this cut-off in our MGCFA of time, indicating that these items did not fit both T1 and T2 equally well. Item 12 had a factor loading of .206

at T1 and .621 at T2 indicating that Item 12 was more representative of the underlying construct at T2. Item 12 had an average factor loading of .60 in three of the four current studies. Item 14 had a factor loading of .768 at T1 and .644 at T2 indicating that Item 4 was more representative of the underlying construct at T1. Given that the data suggest that Items 12 and 14 are problematic, additional CFAs were conducted to examine the impact of removing these items on model fit. In Sample 1–T1, a CFA without Items 12 and 14 decreased model fit. Given that factor loadings are notoriously variable, it is possible that the two aberrant results are due to small sample sizes (Tabachnick & Fidell, 1996).

Discussion

The first aim of Study 3 was to compare the two-factor and one-factor mindfulness models in two new samples. Replication of these models indicated that the one-factor mindfulness model revealed a superior fit to the data as compared with the two-factor model. The second aim of Study 3 was to establish concurrent validity for the superior model. To maximize the interpretability of the results, we also examined concurrent validity for the mindlessness factor. The mindfulness and mindlessness factors demonstrated inconsistent relationships with negative affect. The mindfulness and mindlessness factors were positively and negatively associated with positive affect respectively.

As expected, the mindfulness factor was positively associated with curiosity, as represented by the exploration and absorption subscales of the CEI (Kashdan et al., 2004) and emotion regulation as measured by the reappraisal subscale of the ERQ (Gross & John, 2003). However, in contrast with predictions, the mindfulness factor was unrelated to suppression. The mindlessness factor was negatively correlated with curiosity and exploration, however unrelated to absorption subscale of the CEI. Furthermore, mindlessness was not consistently related to reappraisal and suppression. The mindlessness factor exhibited a more inconsistent pattern of external correlations than the mindfulness factor. These results provide further justification for a one-factor model of mindfulness.

The final aim of Study 3 was to examine whether the one-factor mindfulness model fit the data equally well across time. Seven of the nine items comprising the mindfulness scale demonstrated structural invariance.

General Discussion

Langer's conceptualization of mindfulness refers to a flexible cognitive state, which emerges from drawing novel distinctions about situations (Carson & Langer, 2006). The current set of studies sought to evaluate the factor structure of the MMS, a self-report measure developed to capture Langer's theoretical model of mindfulness. Results failed to replicate the proposed four-factor structure of the MMS. A series of structural equation models in three independent studies yielded a one-factor model of Langer's theoretical conceptualization of mindfulness that sampled from each of the four original MMS subscales (novelty seeking, novelty producing, engagement, and flexibility). The revised MMS reflects a global measure of mindfulness rather than a multifactorial scale as originally suggested by Bodner and Langer (2001). Further scale construction is needed to establish items that discretely assess Langer's mindfulness theory in a multi-faceted manner.

In addition to providing psychometric support for a monofactorial mindfulness scale, the current studies offered modest evidence for convergent validity. While the majority of the affect-laden variables (i.e., positive/negative affect, depression, anxiety, ruminative brooding, and worry) were unrelated or inconsistently related to the MMS, the mindfulness factor was strongly related to a measure of curiosity. This association serves as encouraging evidence of convergent validity as Kashdan et al's curiosity construct and Langer's conceptualization of mindfulness share overlapping attributes. Specifically, Kashdan et al.'s curiosity construct emphasizes a cognitive system that identifies, seeks out, and regulates novel and challenging opportunities, which is similar to Langer's novelty seeking and novelty producing components of mindfulness. Furthermore, the results suggest that the CEI's absorption subscale, which refers to flow-like engagement, overlaps with Langer's conceptualization of engagement. These findings raise an important question: In what way are these constructs different from one another? Future research would benefit from examining whether the MMS has incremental validity over the CEI in predicting other variables.

Analyses examining convergent validity revealed that the MMS was positively associated with reappraisal, an emotion regulation strategy that refers to capacity to reframe emotional events in order to change the emotional impact of the situation. However, contrary to predictions, the mindfulness factor was unrelated to suppression or the capacity to restrain emotional behavior that is currently underway. Results indicated that Langer's conceptualization of mindfulness is generally related to affect; however, unrelated to symptoms of depression and anxiety. This finding represents a departure from Eastern conceptualizations of mindfulness, which have shown stronger associations with psychological symptoms and affect (Baer et al., 2006; Brown & Ryan, 2003). One possible interpretation is that this differential pattern of associations might reflect meaningful differences between Eastern and Western conceptualizations of mindfulness.

Limitations

Although the present set of studies employed four relatively large sample sizes, there are some notable limitations. First,

all samples were composed of largely Caucasian college students, which limit generalizability to other populations and thus, necessitates replication in ethnically diverse clinical and community samples. Second, unfortunately the current study did not examine whether the revised version of the MMS has similar relationships with constructs that were shown to relate to the original scale. Third, the current studies did not examine incremental validity to determine how the MMS functions relative to other mindfulness measures. Validation is an ongoing process and additional research on the MMS is warranted.

Future Directions

Future research should be directed at examining the relationship of the MMS within the family of measures purporting to measure mindfulness. Researchers have attempted to develop an operational definition of mindfulness as conceptualized by secularized adaptations of Eastern Buddhist traditions (Bishop et al., 2004; Brown & Ryan, 2003; Brown, Ryan, & Creswell, 2007). Brown and Ryan (2003) defined mindfulness as a receptive attention to and awareness of present events and experience. Bishop et al. (2004) have proposed a two-component model of mindfulness that emphasizes self-regulation of attention on immediate experiences that is characterized by openness, curiosity, and acceptance. Bishop et al. (2004) suggest that Langer's conceptualization of mindfulness differs from their conceptualization in that,

> Langer's mindfulness involves the active construction of new categories and meanings when one pays attention to the stimulus properties of primarily *external* situations, while our own definition emphasizes the inhibition of such elaborative processes as one pays attention to primarily *internal* stimuli (thoughts, feelings and sensations). (p. 6)

Indeed Langer's conceptualization of mindfulness emphasizes cognitive processes operating on cues from the external environment; however Brown and Ryan (2004) have argued that mindfulness should not be bound to meditation by the definitions' emphasis on consciousness of internal stimuli. Rather, Brown and Ryan (2004) have suggested that mindfulness is an inherent aspect of the human condition that can be enhanced by training (i.e., meditation). Although Langer's theory of mindfulness clearly differs in focus from secularized adaptations of Eastern Buddhist traditions, future research is needed to determined whether the difference in emphasis reflect separate constructs or different aspects of the same construct.

It is likely that researchers will gain greater insight into the nature of mindfulness by studying how the various conceptualizations of mindfulness relate to one another. To this end, the revised version of the MMS may serve an important function as the only measure developed to examine individual differences in mindfulness from a Western scientific or cognitive perspective.

Declaration of Conflicting Interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

Notes

1. An oblique rotation was used because Bodner and Langer's (2001) conceptualization of mindfulness and mindlessness operationalize them as opposing sides of a single dipole. As a result, one would predict them to be negatively correlated. However, identical results were obtained with a varimax rotation. These results are available from the authors by request.
2. A key question unanswered by Study 1, is whether the two-factor model reflects two constructs that have substantive and distinct meaning or whether the mindlessness construct represents a methods factor or an artifact of response style. To examine whether the two factors of the Mindfulness/Mindlessness Scale (MMS) reflected two distinct constructs or a mindfulness factor and methods factor, we conducted a confirmatory factor analysis (CFA) in a new sample. The methods factor was theorized to represent participants responding in a fixed style to the reverse-scored items. CFAs were conducted to examine the fit of a two-factor model composed of a mindfulness factor and a methods factor, where all items retained in the initial exploratory factor analysis model of Study 1 were allowed to load on a mindfulness factor and reverse-scored items were allowed to cross-load on a second, methods factor. The CFA for the methods factor model yielded the following fit indices: $\chi^2(99, N = 457) = 238.95$, $p < .001$; final fit index, CMIN/df = 2.41; comparative fit index (CFI) = .91; standardized root mean squared residual (SRMR) = .05; root mean square error of approximation (RMSEA) = .06; 90% confidence interval on RMSEA = .05-.07. The results of all method factor CFA analyses are presented in Table 2. The same post hoc model modifications that were applied to the two-factor mindfulness/mindlessness model (see Study 2) were performed on this model (correlating the error terms of Items 17 and 20 and deleting Items 16, 18, and 21) in an attempt to develop a better fitting model. The post hoc model modifications yielded the following fit indices: $\chi^2(60, N = 457) = 102.79$, $p < .001$; CMIN/df = 1.71; CFI = .96; SRMR = .04; RMSEA = .04; 90% CI on RMSEA = .03-.05. Interestingly, the reverse-scored items loaded poorly on the mindfulness factor.

   There are two possible interpretations that may account for a methods factor model with good fit, despite the fact that the methods factor items have poor loadings on the main factor.

One interpretation is that the introduction of the latent methods factor resulted in a reduction in the loadings of the methods factor items on the main factor. The other explanation is that the items truly measure a construct that is distinct from the main factor.

To determine whether the loadings on the mindfulness factor were attenuated due to the introduction of the method factor, a one-factor CFA, which included all of the scale items, was conducted. The model converged after seven iterations and yielded the following fit indices: $\chi^2(64) = 288.13$, $p < .001$; CMIN = 4.50; CFI = .81; SRMR = .09; RMSEA = .09; 90% CI on RMSEA = .08-.10. This model failed to fit the data well suggesting that the low item loadings on the mindfulness factor were not due to the introduction of the methods factor. Rather, they represent a unique construct, possibly a mindlessness construct, which is distinct from the mindfulness factor.

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