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Linguistic Predictors of Mindfulness in Written Self-Disclosure Narratives

Susan D. Moore and Leslie R. Brody

Boston University, Massachusetts

Abstract

This study investigated whether relative changes in cognitive, emotion, temporal, and self-reference word frequencies in repeated narratives predicted improvements in mindfulness skills (i.e., nonjudgmental acceptance of present-moment experiences, observing and describing present stimuli, and acting with awareness) subsequent to narrative self-disclosure. Participants wrote repeated narratives of traumatic or daily events over 3 days. Mindfulness was assessed at baseline and 4 to 8 weeks posttask. Results indicated that relative increases in cognitive processing words (among traumatic events participants and women in both conditions) and present tense words (among all participants) significantly predicted increases in nonjudgmental acceptance, describing, or overall mindfulness. Increases in present tense words appeared to partially mediate the higher mindfulness outcomes of participants writing about daily events when compared with those writing about trauma. The findings suggest that linguistic changes in self-disclosure narratives are associated with improvements in specific mindfulness skills.

Keywords

mindfulness; narratives; self-disclosure; linguistic analysis

Mindfulness is commonly defined as the focusing of one's accepting, nonjudgmental attention on present-moment experience (Kabat-Zinn, 1990, 2005). With roots in Buddhism and other Eastern meditation traditions, training in mindfulness skills is being increasingly incorporated into Western interventions for a wide range of psychological disorders (Baer, 2006). Researchers have recently developed both operational definitions and valid assessment measures for mindfulness—two elements of primary importance to scientific developments in the field. Baer, Smith, and Allen (2004) have offered a particularly thorough treatment of the multidimensional mindfulness construct and have developed a self-report measure that significantly differentiates four components of mindfulness: accepting present-moment experiences, acting with awareness (i.e., behaving with undivided attention), observing internal and external stimuli, and describing or labeling internal and external stimuli. These aspects of mindfulness have been found to differentially relate to aspects of personality and mental health. For example, subscales corresponding to acceptance of present-moment experiences, acting with awareness, and describing stimuli

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were significantly negatively related to neuroticism, general psychopathology, and experiential avoidance, whereas subscales corresponding to observing and describing of stimuli were significantly positively related to emotional intelligence and significantly negatively related to alexithymia (Baer et al., 2004). Using their own unidimensional self-report measure of mindfulness, Brown and Ryan (2003) found that more mindful individuals displayed greater concordance of implicit and explicit affect, suggesting greater self-knowledge and attunement to implicit experience. Other research has indicated that training in mindfulness, including attending to the present moment and enhancing self-awareness, is useful in the treatment of anxiety and depression (Kabat-Zinn et al., 1992; Miller, Fletcher, & Kabat-Zinn, 1995; Teasdale, Segal, & Williams, 1995).

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Recently, Brody and Park (2004) have theorized that the process of mindfulness may be involved in the narrative emotional disclosure task (Pennebaker & Beall, 1986). The narrative disclosure task, in which individuals write repeated narratives about traumatic experiences while attending to their “deepest thoughts and emotions,” requires self-directed attention that may heighten awareness of internal experiences (Brody & Park, 2004) and might be expected to generate increased awareness of both cognitive and affective states. Previous research has indicated that nonemotional narrative disclosure, in which participants are instructed to write detailed descriptions of their daily lives, may also increase mindfulness (Moore, Brody, & Dierberger, in press). However, changes in the linguistic characteristics or composition of narratives that may correlate with shifts in mindfulness are as yet unknown. For both theoretical and applied reasons, it would be helpful to understand if and how the language people use to describe personal experiences significantly relates to mindfulness and changes in mindfulness.

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Previous linguistic analyses have linked specific patterns of changes in language use to favorable outcomes, including psychologically important outcomes. Schwartz and Drotar (2004) found that relatively less frequent use of negative emotion words over time was a significant predictor of improved health-related quality of life—but only when that change occurred within the context of increased cognitive processing words. Findings on the association between positive outcomes and higher relative usage of words denoting cognitive processes (e.g., “think,” “realize,” “understand,” and other words referring to insight and causation) are quite consistent across studies (Pennebaker, 1993; Pennebaker, Colder, & Sharp, 1990; Pennebaker & Francis, 1996; Pennebaker, Mayne, & Francis, 1997). Recently, Rivkin, Gustafson, Weingarten, and Chin (2006) found that HIV+ adults whose emotional disclosure narratives reflected relative increases in the use of causation/insight words over time reported fewer negative changes in their lives brought about by having HIV (e.g., stigma, hopelessness, and negative effects on physical and social well-being). Similarly, Alvarez-Conrad, Zoellner, and Foa (2001) reported that higher levels of cognitive processing words were associated with lower postintervention anxiety among female sexual assault victims. Finally, Ullrich and Lutgendorf (2002) found that relative increases in cognitive processing words were associated with improvements in posttraumatic psychological growth (i.e., self-reported perceived benefits, such as increased personal strength and appreciation for life). Such findings on the associations between psychological outcomes and emotional and cognitive language are intriguing; it remains to be seen whether emotional and cognitive language patterns bear similar relationships to mindfulness.

Little attention has been paid in the literature to the potential influences of temporal words—that is, verb tense—on narrative task outcomes. Research and theoretical work on mindfulness suggests that the use of present tense verbs would be most characteristic of mindfulness, defined in part as a present awareness of momentary experiences. Pennebaker et al. (1997) reported that less frequent use of past tense verbs over the course of writing three narratives was associated with higher posttask distress within a sample of bereaved adults. The authors interpreted lack of past tense language as evidence of a failure to confront past traumas and hypothesize that this failure may be an indicator of poor coping.

Limited research also exists on the relationship between self-reference words, that is, first-person pronouns, and narrative outcomes. Some evidence suggests that self-focused attention in the form of self-references is associated with depression (Rude, Gortner, & Pennebaker, 2004; Sloan, 2005) and avoidance of stressful experiences (Boals & Klein, 2005). Although on one hand, greater mindfulness might also be expected to be associated with heightened self-references, insofar as mindfulness presumes self-awareness and the application of language to describe one's personal experiences, a more Eastern view of mindfulness suggests that it might be associated with diminished self-references, as people increasingly focus on the present moment and the interconnections among all experiences rather than on their unique self-identity.

Few studies have examined whether patterns of relationships between linguistic variables and outcomes vary by gender, although much research has documented that women express more frequent and more intense emotions, both positive and negative, than men do across written, oral, and self-report measures (Brody & Hall, 2000). However, recent research has not found gender differences in the average frequencies of emotional or cognitive processing words in the narrative disclosure task (Epstein, Sloan, & Marx, 2005; Owen et al., 2006). On the other hand, when Epstein et al. (2005) looked more broadly at their entire sample (i.e., control and experimental conditions together), they found that women displayed higher frequencies of cognitive processing words than men. Owen, Klapow, Roth, and Tucker (2004) reported that female breast cancer patients made greater use of cognitive processing, positive emotion, and negative emotion words than male prostate cancer patients in online support group transcripts; these patterns appeared stable, as the authors did not observe gender differences in linguistic changes over time. The limited available research on gender differences in narrative disclosure word content—and particularly changes in content over the course of repeated disclosure—suggests a need for ongoing research.

In brief, the linguistic patterns over time associated with better narrative disclosure task outcomes have included more frequent expression of cognitive processing words, moderate expression of negative emotion words, and more frequent expression of past tense verbs. Although there is little existing research to guide assumptions regarding linguistic patterns and mindfulness, some ideas are intuitively appealing. Increases in emotional content are consistent with increased mindfulness in the sense that mindfulness implies openness to both positive and negative states. Similarly, increases in cognitive processing language—including words such as “think,” “know,” and “realize”—may be consistent with heightened self-awareness and acknowledgment of cognitive states. The operational definition of mindfulness, as nonjudgmental attention to the “here and now” aspects of one's experience,

suggests that relative increases in use of present tense words may also be associated with increased mindfulness. Finally, it is not clear whether mindfulness will be associated with heightened or diminished references to the self, and how these changes in self-references will be related to health outcomes.

Aims of the Present Study

Our aim in the present study was to examine whether the words people use to describe traumatic and day-to-day personal experiences during the course of repeated written narrative disclosure are related to shifts in the multidimensional construct of mindfulness. We investigated changes over time in word use, that is, changes in the relative frequencies of certain linguistic categories across 3 days of narrative writing, to begin identifying the writing processes and narrative content most likely to result in heightened acceptance, awareness, observing, and describing of individuals' moment-to-moment experiences. We hypothesized that relative increases in cognitive processing, positive and negative emotion, and present tense words in written self-disclosure narratives would be significantly associated with increases in all four components of mindfulness. Exploratory questions, given the dearth of literature to date, concerned (a) the nature of the relationships between changes in mindfulness and changes in past tense, future tense, and self-reference word use and (b) whether or not gender differences would emerge in the relationships between relative changes in word use and changes in mindfulness. Cross-sectional relationships between baseline mindfulness and types of word use were also examined.

Previous analyses using this sample had indicated that the participants who wrote about events of their day increased more over time in one component of mindfulness than did the participants who wrote about traumatic events (Moore et al., in press). The present study did not further investigate group differences in outcome. Moreover, previous work on this sample indicated that writing about traumatic events produced narratives that were significantly higher in average frequencies of positive, negative, and overall emotion words (Moore et al., in press), as well as more cognitive processing words (Moore & Brody, 2008), than writing about events of the day. Additional work using this sample indicated that women's narratives contained higher average frequencies of positive and overall emotion words than men's narratives as well as greater numbers of cognitive processing words, with no interactions between writing condition and gender for these variables (Moore, 2007). In contrast to the aforementioned examinations of average word frequencies across repeated narratives, the focus of the present study is on how linguistic *changes* across both writing conditions related to changes in mindfulness.

Method

Participants

Data were gathered as part of a randomized study of narrative emotional disclosure. Young adults at a large, urban university ($N = 314$) participated in exchange for partial course credit (for completion of Phase 1, written narrative disclosure) and a modest payment of \$15 to \$30 (for completion of Phase 2, the posttask assessment). Of those who completed Phase 1, 233 participants (55% female; 63% White; M age = 18.88; $SD = 1.17$) also completed Phase

2 and thus comprised the final sample. A 2 (age) $\times$ 2 (gender) analysis of variance (ANOVA) revealed a significant difference in age between men ($M = 19.24$; $SD = 1.30$) and women ($M = 18.59$; $SD = 0.95$), $F(1, 231) = 18.95$, $p < .001$. Because of this confound, age was added as a covariate in subsequent analyses.

Materials

Mindfulness—The Kentucky Inventory of Mindfulness Skills (KIMS; Baer et al., 2004) is a 39-item self-report inventory. It measures four proficiencies related to mindfulness, corresponding to distinct subscales: the Accept without Judgment subscale (9 items), which measures one's tendency to apply nonjudgmental acceptance to present-moment experiences (e.g., "I criticize myself for having irrational or inappropriate emotions" [reverse scored]); the Act with Awareness subscale (10 items), which corresponds to the focusing of one's attention on present activity (e.g., "I get completely absorbed in what I'm doing, so that all my attention is focused on it"); the Observe subscale (12 items), which measures tendencies to observe internal and external stimuli (e.g., "I pay attention to sensations, such as the wind in my hair or sun on my face"); and the Describe subscale (8 items), which refers to describing or labeling observed phenomena (e.g., "My natural tendency is to put my experiences into words"). Respondents endorse statements on a 5-point scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*). Baer et al. (2004) reported that the inventory demonstrates adequate psychometric properties, including content validity, test-retest reliability, and internal consistency. Internal consistency of the KIMS in the present study was adequate; alpha coefficients at baseline and posttask were .84 and .85, respectively.

Linguistic variables—Narratives were analyzed with Linguistic Inquiry and Word Count software (LIWC; Pennebaker, Francis, & Booth, 2001). This text analysis program evaluates narratives using a dictionary of more than 2,300 words/word stems that are grouped into 74 categories. The program provides percentages of total words used that fall into each category, thus controlling for absolute text length. Support for the LIWC's external validity comes from agreement between independent judges and the text analysis program on the categorization of cognitive processing, emotional, past tense, and other words (Pennebaker & Francis, 1996). More recently, Kahn, Tobin, Massey, and Anderson (2007) examined the LIWC's construct validity and concluded that it provides valid measurements of emotional content, as indicated by its ability to distinguish among narratives specifically designed to contain target emotions (e.g., the LIWC successfully detected higher percentages of positive emotion words in narratives about, or in response to, amusing events). In the present study, we examined the categories of positive emotion (e.g., "happy," "good"), negative emotion (e.g., "hate," "worthless"), and cognitive processing words (e.g., "think," "realize," "could," "should"; this includes causation, insight, and discrepancy word subcategories). Self-references (first-person pronouns, e.g., "I," "me") and the temporal categories of present (e.g., "is," "am"), past (e.g., "was," "been"), and future tense words (e.g., "will") were also examined. To investigate shifts in word usage over time, change scores were computed by subtracting word category percentages at the first writing session from those at the third session. Thus, higher change scores indicate increases in specific word categories over the course of 3 days' writing. The procedure for computing change scores is similar to that

described in previous narrative disclosure studies (Pennebaker et al., 1997; Pennebaker & Francis, 1996).

Procedure

The present study included two phases. In Phase 1, after providing written informed consent, participants completed baseline measures including a demographics questionnaire and the KIMS. Subsequently, individuals were randomly assigned to one of two conditions: a traumatic events writing condition or a daily events writing condition. After receiving a general overview, traumatic events participants were instructed to write about a traumatic or upsetting experience; daily events participants were instructed to write nonemotional descriptions recounting how they spent their time the previous day. Writing sessions lasted 20 minutes and took place in private rooms. Participants returned on 2 consecutive days to repeat this writing procedure; traumatic events participants continued to write about traumatic experiences, whereas daily events participants wrote descriptions of how they spent their time during the current day and how they planned to spend their time the next day. All writing instructions were provided in printed format and were adapted from Pennebaker (1994). In Phase 2, research staff e-mailed participants 4 weeks after the third and last writing session with invitations to complete a posttask version of the KIMS via a secure website. The post-task questionnaire was modified such that participants were instructed to consider “the last few weeks” when responding. Posttask assessments occurred, on average, at 4 weeks and 4 days following the last writing session. Finally, participants were debriefed as to the purposes of the study. All study procedures were approved by the Boston University Department of Psychology Internal Review Board.

Results

Preliminary Analyses

One-way ANOVAs analyzing differences between completers and noncompleters (i.e., those who did not return for the follow-up assessment 4 weeks subsequent to narrative writing) indicated that there were no significant differences between those who completed both phases of the study ($N = 233$) and those who did not ($N = 81$) in total KIMS scores at baseline, average narrative length, or linguistic difference variables representing changes in positive emotion, negative emotion, past tense, and future tense words. Analyses revealed small but significant differences by completer status for changes in cognitive processing words, $F(1, 312) = 6.77, p < .01$, partial $\eta^2 = .02$, present tense words, $F(1, 312) = 4.89, p < .03$, partial $\eta^2 = .02$, and self-references, $F(1, 312) = 5.28, p < .02$, partial $\eta^2 = .02$. In each case, higher difference scores for completers (cognitive processing words: $M = 0.42, SD = 1.39$; present tense words: $M = 1.79, SD = 2.06$; self-references: $M = 0.04, SD = 2.11$) relative to noncompleters (cognitive processing words: $M = -0.05, SD = 1.34$; present tense words: $M = 1.19, SD = 2.24$; self-references: $M = -0.58, SD = 2.08$) indicate greater increases in these word frequency categories from the first to the third narrative for completers versus noncompleters.

KIMS total scores, that is, the sum of all KIMS items, averaged 123.26 ($SD = 16.16$) at baseline and 119.41 ($SD = 16.89$) at posttask. Table 1 displays means and standard

deviations for the KIMS scale and each KIMS subscale; additional descriptive statistics (e.g., means and standard deviations by gender and condition) have been reported elsewhere (Moore et al., in press), and indicated that although there were no significant shifts in total mindfulness for either experimental or control participants, the control group increased significantly in one component of mindfulness, nonjudgmental acceptance.

Total word counts for each narrative ranged from 532 to 4,713 ($M = 1088.22$; $SD = 357.56$). On average, 44.57% ($SD = 5.89$) of words contained in participants' narratives were represented in the LIWC dictionary and were included in linguistic analyses. Descriptive statistics by gender and condition for linguistic category change scores are displayed in Table 2. Two-way ANOVAs (writing condition $\times$ gender, with age as a covariate) for changes in positive emotion, negative emotion, cognitive processing, and self-reference word frequencies indicated no significant main effects or interactions. A similar two-way ANOVA for present tense word change scores indicated significant main effects for condition, $F(1, 228) = 65.99$, $p < .001$, partial $\eta^2 = .22$, and gender, $F(1, 228) = 8.11$, $p < .01$, partial $\eta^2 = .03$, indicating that participants who wrote about daily events displayed greater increases in present tense words than participants who wrote about traumatic events, and that women displayed greater increases in present tense words than men. A two-way ANOVA for past tense change scores revealed a significant main effect for condition, $F(1, 228) = 185.40$, $p < .001$, partial $\eta^2 = .45$, indicating that daily events participants decreased more in past tense words than traumatic events participants. A one-way ANOVA for future tense change scores indicated no significant difference by gender. A Mann–Whitney test indicated that daily events participants (median = 2.09) increased significantly more in future tense words than traumatic events participants (median = 0.19), $U = 469.00$, $p < .001$, $r = -.74$. (The Mann–Whitney nonparametric test was conducted given a significant result for Levene's test, $F(3, 229) = 35.68$, $p < .001$, demonstrating that that future tense change score variances were unequal by condition.)

We also conducted Pearson correlations to examine cross-sectional relationships among mindfulness scores at baseline and word category frequencies on the first day of writing. Across conditions, frequency of positive emotion words was significantly negatively correlated with baseline Accept without Judgment scores ($r = -.14$; $p < .03$) and significantly positively correlated with Describe scores ($r = .14$; $p < .04$). Frequency of self-references was negatively correlated with Observe scores ($r = -.14$; $p < .03$). All other correlations were nonsignificant at the $p < .05$ level.

Multiple Regression Analyses

We conducted hierarchical multiple regressions to test our hypothesis that relative increases in the frequencies of cognitive, emotional, and present tense words would predict increased posttask mindfulness. A first set of regressions focused on changes in emotion and cognitive processing words as predictors of mindfulness; a second set focused on changes in present, past, and future tense words; and a third set focused on changes in self-references. In addition to examining the KIMS total scale score, each of the four KIMS subscale scores (i.e., Accept without Judgment, Act with Awareness, Observe, and Describe) were examined as outcomes in separate regressions.

In the first set of regressions, predictor variables included age and the selected KIMS scale or subscale at baseline (entered simultaneously in Step 1). Gender, writing condition (i.e., traumatic events vs. daily events disclosure), and cognitive processing, positive emotion, and negative emotion word change scores were entered in Step 2. Dummy variables representing two-way interactions among gender, writing condition, cognitive processing, positive emotion, and negative emotion word change scores were entered in Step 3; three-way interactions among these variables were entered in Step 4. Two significant interactions emerged in this first set of regression analyses. The interaction between writing condition and change in cognitive processing words significantly predicted Accept without Judgment scores, $\beta = -.10$, $t(216) = -2.02$, $p < .05$. Simple regressions performed separately by condition revealed that within the traumatic events writing condition, relative increases in cognitive processing words from the first to the third narrative significantly predicted increased nonjudgmental acceptance from baseline to posttask, $\beta = .18$, $t(156) = 2.92$, $p < .01$. There were no significant findings in the daily events writing condition. A second interaction in this set of analyses, between gender and change in cognitive processing words, significantly predicted KIMS Describe scores, $\beta = .11$, $t(216) = 2.34$, $p < .02$, and KIMS total scores, $\beta = .09$, $t(216) = 2.02$, $p < .04$. Simple regressions performed separately by gender indicated that among women, relative increases in cognitive processing words significantly predicted increased describing of internal and external stimuli from baseline to posttask, $\beta = .14$, $t(125) = 2.33$, $p < .02$, and also predicted increased overall mindfulness from baseline to posttask, $\beta = .13$, $t(123) = 2.03$, $p < .05$. No significant findings were observed among men.

In the second set of regressions, predictor variables included age and the selected KIMS scale or subscale at baseline (entered simultaneously in Step 1). Gender, writing condition, and present, past, and future tense word change scores were entered in Step 2. Dummy variables representing two-way interactions among gender, writing condition, and word change scores were entered in Step 3; three-way interactions among these variables were entered in Step 4. A significant main effect indicated that change in present tense words significantly predicted Accept without Judgment scores, $\beta = .13$, $t(216) = 2.09$, $p < .04$, such that increases in present tense words from the first to third narrative in both conditions were associated with relative increases in nonjudgmental acceptance from baseline to posttask. A main effect also emerged for change in future tense words significantly predicting Observe scores, $\beta = .29$, $t(216) = 2.43$, $p < .02$, such that relative increases in future tense words from the first to third narrative were associated with increased observing of internal and external stimuli from baseline to posttask. Finally, changes in past tense, $\beta = .16$, $t(216) = 2.31$, $p < .02$, and future tense, $\beta = .27$, $t(216) = 2.37$, $p < .02$, words significantly predicted Describe scores at posttask, such that relative increases in the frequencies of these word categories from the first to third narrative were associated with increased describing of internal and external stimuli. Changes in the frequencies of present, past, and future tense words did not predict Act with Awareness scores or total KIMS scores at posttask.

In the third set of regressions, predictor variables included age and the selected KIMS scale or subscale at baseline (entered simultaneously in Step 1). Gender, writing condition, and self-reference change scores were entered in Step 2. Dummy variables representing two-way interactions among gender, writing condition, and self-reference change scores were entered

in Step 3; three-way interactions among these variables were entered in Step 4. These analyses yielded no significant findings, that is, change in frequency of self-references from the first to the third day of writing did not predict changes in KIMS scale or subscale scores.

Post Hoc Mediation Analysis

The question emerges as to whether the change in frequency of present tense words (which was significantly higher in the daily events writing condition) mediated the significant difference in nonjudgmental acceptance between the two writing conditions found in previous work (Moore et al., in press). Four steps using regression analyses, as described by Kenny (2008), are required to show mediation. First, an initial variable (writing condition) must be significantly related to an outcome variable (posttask Accept without Judgment scores controlling for baseline scores), which regression analysis revealed it was, $\beta = .13$, $p < .01$. (It is important to emphasize that according to Kenny, associations—rather than significance values—are most important in demonstrating mediation; nevertheless, significance values are provided at each step for reference.) Second, the initial variable (writing condition) must be significantly related to the potential mediator (change in present tense words), which it was, $\beta = .46$, $p < .001$. Third, the mediator should be related to the outcome variable when controlling for the initial variable. This condition is also met, in that a regression analysis indicated that change in present tense words was associated with Accept without Judgment scores at posttask after controlling for writing condition and Accept without Judgment scores at baseline, $\beta = .07$, although this finding was nonsignificant ($p < .16$). These first three steps demonstrate partial mediation. A fourth step is necessary for demonstrating complete mediation in that the relationship between the initial variable (writing condition) and the outcome variable (mindfulness) should be reduced to near 0 when the influence of the mediator (change in present tense words) is controlled. In a regression controlling for change in present tense words, writing condition continued to be associated with Accept without Judgment at posttask, $\beta = .10$, $p < .07$. Thus, change in present tense words did not completely mediate changes in mindfulness but may have partially mediated those changes.

Discussion

Our aim in the present study was to examine the relationships between changes in the multidimensional construct of mindfulness and changes in narrative disclosure word content (including frequencies of cognitive processing and emotion words; present, past, and future tense words; and self-references) after repeated writing about traumatic or daily events. Results of multiple regression analyses confirm that relative increases in present tense words significantly predicted increased nonjudgmental acceptance of present-moment experiences from baseline to posttask. Additional analyses indicate that the significantly greater increase in frequency of present tense words by participants writing about daily events partially mediated the difference found between writing conditions in nonjudgmental acceptance, with the group writing about daily events increasing more in this component of mindfulness than the group writing about trauma.

The significant association between relative increases in present tense words and self-accepting aspects of mindfulness adds to the literature on narrative disclosure and suggests that as individuals focus more on the present moment, they develop an increasingly nonjudgmental attitude toward their ongoing experiences. This is noteworthy in that it is consistent with current clinical literature encouraging individuals to focus on the present moment as a way of decreasing anxiety about either past or future imagined trauma (Linehan, 1993).

Increases in past and future tense words, tested as exploratory variables, were significantly associated with increases in observing (future tense words) and describing of present stimuli (future and past tense words). For example, increases in future tense words were associated with increased endorsement of statements such as, "I pay attention to sensations," and "Even when I'm terribly upset, I can find a way to put it into words." These results are intriguing and suggest that awareness and labeling of previous and future states is related to a tendency to notice internal and external events and possibly to increased planfulness. Although cause and effect are not clear here, these ideas are consistent with Hayes and his colleagues' ideas (Fletcher & Hayes, 2005; Hayes & Wilson, 2003) about the power that descriptive language has in symbolizing and generalizing across experiences, with our capacity for language allowing, leading, and sometimes misleading us to respond to ideas about events that have not yet occurred.

Although participants in the daily events writing condition significantly decreased more in past tense words and increased more in future tense words than did participants in the traumatic events writing condition, the particular aspects of mindfulness that past and future tense linguistic variables were significantly related to (observing and describing of stimuli) did not differ significantly for the two writing conditions (Moore et al., in press). This suggests that perhaps the two groups were not sufficiently different in the patterns of these word usages to affect mindfulness outcomes.

As predicted, relative increases in the use of cognitive processing words from the first to the third narrative were associated with increased nonjudgmental acceptance from baseline to posttask, although this was true only within the traumatic events writing condition. Among women in both conditions, increases in cognitive processing words were associated with increased describing of present stimuli and with increased overall mindfulness. These findings are consistent with previous research showing that relatively more frequent use of cognitive processing words in the narrative emotional disclosure task is associated with beneficial mental health outcomes (Alvarez-Conrad et al., 2001; Ullrich & Lutgendorf, 2002). It is puzzling that significant associations between cognitive processing words and mindfulness did not emerge among all subgroups of our sample. Because women and participants in the traumatic events condition used more cognitive processing words on average than men and participants in the daily events condition did (Moore, 2007; Moore & Brody, 2008), it may be that change in these variables relates to mindfulness only when the initial frequency of word usage is at a high enough level.

Cross-sectional analyses of baseline mindfulness and linguistic categories on the first day of writing indicated that the frequency of positive emotion words was negatively correlated

with nonjudgmental acceptance, suggesting a somewhat defensive function of positive emotion words, or alternatively, that people able to accept experiences are also able to acknowledge less positive emotions. Frequency of positive emotions was also positively correlated with tendencies to describe one's experiences, a finding that is consistent with research indicating that mindful attention to the present moment can ameliorate depression (Miller et al., 1995; Teasdale et al., 1995). The frequency of self-references was negatively correlated with the mindfulness subscale of observing internal and external stimuli, a finding that supports a more Eastern view of mindfulness as an experience of "oneness" with the world and a lessening in importance of individual self-identity. Each of these correlations, though significant, was weak (coefficients $< .15$) suggesting cautious interpretation. Characteristics of our measurement tools may also help explain these associations. For example, a number of Accept without Judgment items refer to negative emotional experiences, which may affect the subscale's relationship to positive emotion language.

It is interesting to note that writing condition did not affect the majority of findings reported here. This suggests that it may be repeated writing, rather than the specific content of what people write about, that affects mindfulness outcomes, with the important caveat that both writing conditions focused on personal experiences. It is also interesting to note that some significant results emerged only when examining individual KIMS subscales rather than total scores. This supports the conceptualization of mindfulness as a multifaceted construct, with each facet bearing different relationships to linguistic variables. For instance, the fact that cognitive processing and emotional words did not significantly predict improved observing of present-moment experiences suggests that shifts in this mindfulness skill may require more intensive self-directed attention—or attention of a different variety—than that provided by narrative self-disclosure. Similarly, shifts in present tense language were associated only with shifts toward increasing acceptance of present-moment experiences, and surprisingly, not with shifts in acting with awareness, observing stimuli, and describing experiences. Whether these nonsignificant associations are a function of limitations of the KIMS as a self-report measure could be a focus of future research.

Limitations of the present study include reliance on a university student sample with relatively homogeneous demographic characteristics, which restricts generalizability. The small but significant differences in two linguistic change scores between participants who completed both phases of the study and those who dropped out after the first phase also calls for caution in interpreting our results. For example, greater shifts in cognitive processing words among completers suggest that those who may have been more engaged in the self-disclosure tasks were also more likely to remain in the study. Despite its limitations, the present study's findings of significant relationships between mindfulness and linguistic variables, as well as its novel application of quantitative linguistic analysis to an examination of shifts in mindfulness over time, provides a foundation for subsequent investigations of narrative self-disclosure and self-awareness constructs such as mindfulness. If the significant associations we observed between increased mindfulness and increases in certain linguistic categories can be replicated—suggesting that the linguistic variables are indeed valid indicators of shifts in mindfulness—future research could address whether writing protocols specifically designed to elicit such language are powerful enough to *create* shifts in mindfulness and other self-awareness variables. Sophisticated text analysis technology able

to assess language patterns consistent with the multifaceted aspects of mindfulness (e.g., to discriminate between judgmental and nonjudgmental self-references) would also expand our understanding of linguistic indicators of complex psychological processes.

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Biographies

Susan D. Moore is a postdoctoral research fellow at the Stanford Prevention Research Center in the Stanford University School of Medicine. She obtained her doctorate in clinical psychology from Boston University. Her research interests include self-awareness and self-regulatory processes, particularly as they relate to the initiation and maintenance of health behaviors.

Leslie R. Brody is professor of psychology at Boston University. She served as director of the Boston University Clinical Psychology PhD program from 1991 to 1996 and was the Marion Cabot Putnam Fellow at the Radcliffe Bunting Institute from 1994 to 1995. Her research interests include gender and ethnic differences in coping and emotion in relation to

health outcomes, using autobiographical narratives as an assessment and therapeutic tool. She has published numerous research papers and theoretical reviews about these issues, as well as a book, *Gender, Emotion, and the Family* (1999).

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Table 1Means, Standard Deviations, and Ranges for KIMS Scale and Subscale Scores ($N = 233$)

	Baseline		Posttask	
	Mean (<i>SD</i>)	Range	Mean (<i>SD</i>)	Range
Accept without Judgment	32.25 (7.13)	14–48	32.93 (8.65)	10–50
Act with Awareness	28.37 (5.23)	14–47	28.19 (6.04)	10–50
Observe	38.11 (7.59)	21–59	35.55 (9.29)	14–60
Describe	27.30 (6.06)	11–40	26.69 (6.76)	8–40
KIMS total	122.47 (14.76)	77–165	120.02 (17.30)	51–183

Note: KIMS = Kentucky Inventory of Mindfulness Skills.

Table 2

Descriptive Statistics for Linguistic Change Scores by Gender and Condition

	Total Sample			Men			Women		
	All (N = 233)			All (n = 105)			All (n = 128)		
	M (SD)	Range		Trauma (n = 159) M (SD)	Daily (n = 74) M (SD)	Trauma (n = 68) M (SD)	Daily (n = 37) M (SD)	Trauma (n = 91) M (SD)	Daily (n = 37) M (SD)
Positive emotion	0.08 (0.59)	-2.21 to 1.59		0.11 (0.63)	0.004 (0.51)	0.18 (0.54)	-0.09 (0.58)	0.07 (0.69)	0.09 (0.43)
Negative emotion	-0.07 (0.62)	-2.36 to 1.46		-0.05 (0.72)	-0.13 (0.31)	-0.13 (0.73)	-0.19 (.32)	0.01 (0.72)	-0.07 (0.29)
Cognitive processing	0.42 (1.39)	-3.90 to 6.13		0.46 (1.51)	0.32 (1.11)	0.43 (1.55)	0.02 (1.40)	0.48 (1.48)	0.62 (1.09)
Present tense	1.79 (2.06)	-4.14 to 6.25		1.15 (1.85)	3.18 (1.79)	0.73 (1.76)	2.74 (1.87)	1.46 (1.87)	3.62 (1.60)
Past tense	-2.11 (2.31)	-7.38 to 4.41		-1.07 (1.85)	-4.34 (1.49)	-0.60 (1.61)	-4.25 (1.53)	-1.43 (1.96)	-4.42 (1.47)
Future tense	0.81 (1.18)	-0.84 to 5.05		0.19 (0.42)	2.14 (1.12)	0.16 (0.42)	1.92 (1.23)	0.22 (0.42)	2.36 (1.17)
Self-references	0.04 (2.11)	-5.57 to 6.14		0.19 (2.04)	-0.28 (2.22)	0.10 (2.32)	-0.57 (1.76)	0.26 (1.81)	0.01 (2.60)

Note: "Trauma" refers to the traumatic events writing condition; "daily" refers to the daily events writing condition. Values represent the difference in percentage of total words used between the first and the third narratives.