Journal of Cognitive Psychotherapy: An International Quarterly
Volume 23, Number 3 • 2009

Psychological Functioning in a Sample of Long-Term Practitioners of Mindfulness Meditation

Emily L. B. Lykins, MS
Ruth A. Baer, PhD
University of Kentucky, Lexington

Although mindfulness meditation traditionally is viewed as a lifelong practice, much current knowledge about its effects is based on short-term practitioners who have participated in mindfulness-based treatment. In the current study, long-term meditators and demographically similar nonmeditators completed self-report measures of constructs expected to be related to the practice of mindfulness meditation. Extent of meditation experience was correlated in the expected directions with levels of mindfulness and with many other variables. Mean differences between meditators and nonmeditators were significant in most cases. Mediation analyses were consistent with the hypothesis that practicing meditation is associated with increased mindfulness in daily life, which is related to decreased rumination, decreased fear of emotion, and increased behavioral self-regulation. These mechanisms appear partially responsible for the relationships between mindfulness skills and psychological adjustment. Overall, the current study suggests that the long-term practice of mindfulness meditation may cultivate mindfulness skills and promote adaptive functioning.

Keywords: mindfulness; meditation; mechanisms; adaptive functioning

Mindfulness is increasingly recognized as an important phenomenon in both the clinical and the empirical domains. Commonly accepted definitions suggest that mindfulness involves intentionally bringing one's complete attention to the present moment's experiences in a nonjudgmental or accepting way (Brown & Ryan, 2003; Kabat-Zinn, 1990). Eastern spiritual traditions suggest that the cultivation of mindfulness through the regular practice of meditation leads to reduced suffering and increased well-being (Kabat-Zinn, 2000). A growing empirical literature supports the efficacy of several mindfulness- and acceptance-based interventions for a wide range of populations and disorders (Baer, 2003; Grossman, Neimann, Schmidt, & Walach, 2004; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Robins & Chapman, 2004). As a group, these interventions have been described as the "third wave" of the cognitive-behavioral tradition (Hayes, 2004, p. 639) because they integrate cognitive and behavioral methods with an increased focus on contextual and experiential strategies, including mindfulness, acceptance, and values (Hayes, 2004).

Among empirically supported mindfulness-based treatments, the most intensive meditation training is provided by mindfulness-based cognitive therapy (MBCT; Segal, Williams, &

DOI: 10.1891/0889-8391.23.3.226

Teasdale, 2002) and mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982, 1990), which are typically 8 weeks in duration. Many participants have little or no previous experience with mindfulness or meditation. Thus, much current knowledge about the effects of mindfulness practice on psychological functioning is based on relative novices or short-term practitioners. In addition, most studies have emphasized symptom reduction as the primary dependent variable. However, in the Buddhist traditions, meditation is viewed as a regular lifelong practice in which mindfulness is cultivated over a period of many years and a wide range of effects is expected, including increased awareness, insight, compassion, equanimity, and wisdom (Goldstein, 2002). Therefore, more comprehensive study of individuals who have practiced mindfulness meditation over extended periods of time could provide valuable information about its psychological effects (Walsh & Shapiro, 2006).

Previous Studies of Long-Term Meditators

Only a few studies of experienced meditators have appeared in the literature. Shapiro (1992) studied the motivations for and perceived outcomes of meditation in 27 practitioners with an average of 4.27 years of experience. Reported motivations included self-regulation, self-exploration, and self-liberation (sense of harmony with the universe and capacity for compassion and service). Changes in brain functions related to attentional processes in long-term meditators have been reported by Brefczynski-Lewis, Lutz, Schaefer, Levinson, and Davidson (2007) and Slagter et al. (2007). In a study of meditation and emotional awareness, Nielsen and Kaszniak (2006) found that long-term meditation may influence how emotionally ambiguous information is processed, regulated, and represented in conscious awareness. However, the small sample size (11 long-term mediators and 17 nonmeditating controls) limited the conclusions that could be drawn.

Baer et al. (2008) studied relationships between meditation experience, mindfulness, and psychological adjustment in a sample of 213 experienced meditators. This study's primary purpose was the validation of the Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006), a recently developed self-report measure of the general tendency to be mindful in daily life. Mindfulness scores were significantly related to meditation experience and well-being, and mediation analyses were consistent with an important tenet of Buddhist-based meditation traditions: that the long-term practice of mindfulness meditation cultivates the ability to be mindful in general daily life, which in turn enhances psychological well-being. However, this study did not address differences between meditators and nonmeditators in other areas of psychological functioning that should theoretically be related to mindfulness practice and, of central importance to the current investigation, did not examine specific questions about the mechanisms by which increased mindfulness leads to improved psychological adjustment.

Potential Mechanisms by Which Mindfulness Practice Exerts Beneficial Effects

According to the theory underlying MBCT (Segal et al., 2002), the practice of mindfulness cultivates a *decentered* perspective on thoughts and feelings in which these phenomena are viewed as mental events that come and go rather than as necessarily accurate reflections of truth or reality that necessitate specific behaviors. Shapiro, Carlson, Astin, and Freedman (2006) describe a similar mechanism that they term *reperceiving*, or the ability to disidentify from the contents of consciousness and to view one's moment-to-moment experience with enhanced clarity and objectivity. A *decentered* perspective is hypothesized to lead directly to reductions in rumination, as participants learn to observe their thoughts without falling into patterns of elaborated analytical thinking

(Teasdale, 1999; Teasdale, Segal, & Williams, 1995). Ramel, Goldin, Carmona, and McQuaid (2004) demonstrated that currently and formerly depressed participants in MBSR experienced significantly greater reductions in rumination than did a wait-list control group, providing preliminary support for the reduction of rumination as a potential mechanism by which mindfulness practice improves functioning.

Linehan (1993a) and Kabat-Zinn (1982) emphasize the principles of exposure in explaining the positive outcomes of mindfulness practice. As participants engage in sustained, nonjudgmental observation of distressing emotion-relevant sensations and cognitions without attempts to avoid or escape them, reductions in emotional reactivity and avoidance behaviors occur through a process of desensitization. Shapiro et al. (2006) also advance these ideas, though they conceptualize *reperceiving* as the metamechanism that enables effective exposure experiences to occur. Preliminary support for the exposure mechanism is provided by Baer et al. (2006), who found negative associations between self-reported mindfulness and experiential avoidance and thought suppression in a nonmeditating sample.

Mindfulness practice is also theorized to lead to increased behavioral self-regulation, conceptualized as the ability to behave adaptively while distressed (Gratz & Roemer, 2004). The practice of mindfulness is believed to improve self-observation, which promotes recognition of internal states, understanding of the consequences of one's actions, and improved ability to use appropriate coping skills (Kabat-Zinn, 1982; Linehan 1993b; Shapiro et al., 2006; Teasdale et al., 1995). In support of this idea, Baer et al. (2006) found that individuals reporting higher levels of mindfulness also reported greater ability to engage in goal-consistent behavior while upset.

The purpose of the present project was to examine relationships between long-term practice of mindfulness meditation and a broad range of measures of psychological functioning predicted to be related to mindfulness, such as emotional intelligence, openness to experience, rumination, and thought suppression, among others. We examined correlations between these variables and meditation experience and compared long-term meditators and demographically similar nonmeditators. We also used mediation analyses to investigate the ideas described earlier about the mechanisms through which the practice of meditation enhances psychological functioning. We hypothesized that level of mindfulness would mediate the relationships between extent of meditation experience and the three proposed mechanisms noted earlier (reduced rumination, reduced fear of emotion, and increased behavioral self-regulation). We also hypothesized that these potential mechanisms of change would mediate the relationship between the general tendency to be mindful in daily life and psychological health.

Method

Participants and Procedures

We collected data from two samples of participants: regular meditators ($N = 182$) and demographically similar nonmeditators ($N = 78$). Other findings from these samples have been presented in Baer et al. (2008). Different variables and research questions are addressed here.

Regular Meditators. Individuals with a currently ongoing regular meditation practice were recruited in several ways. All individuals who had attended an international mindfulness conference at the University of Massachusetts Medical School in 2005 ($N = 278$) were mailed a packet of materials with an invitation to participate in the study. Data were anonymous, and no compensation was offered other than a teabag included as a token of appreciation. Completed packets were returned by 132 participants (return rate = 48%). Of these, 119 reported a currently ongoing meditation practice (at least once or twice per week) and were therefore included in data analyses. These participants had been asked not to include practices such as yoga, tai chi, chi gong,

or prayer when describing their experience with meditation, and 96% described their practice as primarily or exclusively Buddhist based.

An additional 61 regular meditators were recruited using announcements or flyers that were posted to listservs and other Internet-based groups focused on mindfulness or meditation; distributed in mindfulness meditation and yoga centers in Lexington, Kentucky, and other cities in the Midwest; or posted in the Lexington community. Interested individuals were asked to contact one of the experimenters to request a packet. Completed packets were returned by approximately 60% of those who expressed interest. All these participants reported a currently ongoing regular meditation practice in a Buddhist-based tradition. According to Kabat-Zinn (2003), mindfulness is the core teaching in the many variations of the Buddhist tradition and is "the fundamental stance underlying all streams of Buddhist meditative practice" (p. 146). Thus, the great majority of the sample was engaged in a form of mindfulness meditation.

Age, ethnicity, and education levels did not differ significantly between meditators recruited through the conference and those recruited in other ways. Those recruited through the conference were somewhat more likely to be female and substantially more likely to be mental health professionals.

Demographically Similar Nonmeditators. We used several strategies to recruit nonmeditating individuals who were demographically similar to the meditators. Potential participants were offered $50 to complete a packet of questionnaires similar to that completed by the meditating sample. To recruit nonmeditating mental health professionals, letters were distributed to professional staff mailboxes in local mental health clinics and hospitals and mailed to all mental health professionals listed in the local telephone directory. Letters invited individuals who had never practiced meditation on a regular basis to participate (those who had tried it once or a few times also were eligible). Letters also stated that those using dialectical behavior therapy (DBT; Linehan, 1993a) or acceptance and commitment therapy (Hayes, Strosahl, & Wilson, 1999) in their professional work were not eligible to participate. Although these treatments do not require a regular meditation practice, mindfulness-related concepts and exercises are central components of these treatments, and the effects of working with them may be similar to the effects of regular meditation practice. Of the 50 mental health professionals who expressed interest, 40 (80%) returned a completed packet. Of these, two reported currently engaging in a regular meditation practice and therefore were added to the meditating group. One reported using DBT in her work, and her data were not included in analyses.

Well-educated but nonmeditating participants not working in mental health fields were recruited using letters sent to faculty and staff (excluding social work and psychology departments) of a local college. Persons with degrees in disciplines other than mental health who had never engaged in a regular meditation practice or worked in a mental health field were invited to participate. Of the 48 individuals who expressed interest, 41 (85%) returned a completed packet.

Demographic characteristics of the meditating and nonmeditating samples can be seen in Table 1. The samples did not differ significantly on gender or ethnicity. Both were largely female and White. Although mean age for both groups was in the 40s and most members of both groups held graduate degrees, the meditating sample was significantly older, $t(258) = 4.09$, $p < .001$, and had significantly more years of education, $t(258) = 2.28$, $p < .05$, than the nonmeditators. In addition, the meditating sample included significantly more mental health professionals, $\chi^2 = 12.78$, $p < .001$. Our analytic strategies for controlling for these differences are described in the results section.

The meditators reported an average of 7.6 ($SD = 3.76$) years of regular meditation practice. Most (69%) reported meditating three to six times per week, whereas 14% meditated once or twice per week, and 17% did so seven or more times per week. A substantial majority (72%) meditated for 21 to 45 minutes each time, whereas 19% did so for 1 to 20 minutes, and 10% did so for 45 minutes or more each time. Many (68%) had spent more than 10 days on meditation retreats.

TABLE 1. DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

	Nonmeditators	Meditators
N	78	182
Age in years		
M (*SD*)	43.2 (12.0)	49.6 (11.3)
Range	25–68	23–82
% Male	36	28
% White	90	94
Years of education		
M (*SD*)	18.4 (2.0)	19.0 (1.9)
% MH professional	47	71

Note. *M* = mean, *SD* = standard deviation, MH = mental health.

MEASURES

Many measures of psychological variables were included in participants' packets. Because members of the nonmeditating group were paid for their participation, their packets contained all the measures. Time required to complete this packet was estimated at 60 to 75 minutes. Because the meditating sample was not compensated, some of the measures were included in only one-third of their packets in order to restrict estimated completion time to 50 to 60 minutes. Between 53 and 66 meditators completed each of these measures. All the following instruments have been shown to have good reliability, significant correlations in the expected directions with other measures, and a clear factor structure (where relevant).

Mindfulness. All participants completed the FFMQ (Baer et al., 2006), a 39-item measure of the general tendency to be mindful in daily life. This measure was derived from an exploratory factor analysis of several previously developed mindfulness questionnaires (Baer et al., 2006). The following five elements of mindfulness were found to be represented within the combined item pool. *Observing* includes noticing or attending to internal and external experiences, such as sensations, cognitions, emotions, sights, sounds, and smells. *Describing* involves labeling internal experiences with words. *Acting with awareness* is attending to one's activities of the moment and can be contrasted with behaving mechanically or mindlessly while attention is focused elsewhere (often called *automatic pilot*). *Nonjudging of inner experience* means taking a nonevaluative stance toward thoughts and feelings. *Nonreactivity to inner experience* is the tendency to allow thoughts and feelings to come and go, without getting carried away by or caught up in them. Items are rated on a 5-point Likert scale ranging from 1 (never or very rarely true) to 5 (very often or always true). The five facets have been shown to be internally consistent and correlated in expected directions with numerous other constructs in several samples. They are also significantly correlated with the original mindfulness instruments from which they were derived. Regression, mediation, and confirmatory factor analyses have supported the validity of the FFMQ (Baer et al., 2006, 2008).

Psychological Symptoms and Well-Being. The Depression Anxiety Stress Scales (Lovibond & Lovibond, 1995) includes 42 items measuring negative affect and bodily symptoms. Participants provide Likert ratings of their symptoms over the past week. We used only the total score. The Scales of Psychological Well-Being (Ryff, 1989) include 54 items measuring six elements of well-being: self-acceptance (positive attitude toward one's self, life, and past, including good and bad

qualities), positive relations with others (warm, satisfying, trusting relationships), autonomy (independence, ability to resist social pressures and follow own standards), environmental mastery (competence in managing life's demands), purpose in life (goals and direction, sense of meaning in life), and personal growth (view of self as growing and developing, openness to new experiences). This instrument is based on a review of many theories of psychological health (Ryff, 1989), which is often described as broader than the absence of symptoms (Hayes et al., 1999; Keyes, 2007; Snyder & Lopez, 2002). We used only the total score, which sums the six elements of well-being.

Cognition-Related Variables. The Cognitive Failures Questionnaire (Broadbent, Cooper, Fitzgerald, & Parkes, 1982) assesses absentmindedness, or the tendency to make errors on simple tasks because of inattention. The Rumination-Reflection Questionnaire (RRQ; Trapnell & Campbell, 1999) assesses the tendencies to ruminate and reflect. Rumination, or neurotic self-attentiveness, is recurrent thinking about the self that is motivated by perceived threat, loss, or injustice. Reflection, or intellectual self-attentiveness, is recurrent thinking about the self that is motivated by curiosity. These constructs are believed to be meaningfully distinct because of their differential motives for self-attentiveness. The Scale of Dissociative Activities (Mayer & Farmer, 2003) measures acting without awareness, lack of perception of inner experience, memory disruptions, and perceptions of unreality. The White Bear Suppression Inventory (Wegner & Zanakos, 1994) assesses thought suppression or deliberate attempts to avoid or get rid of unwanted thoughts. Paradoxically, such attempts have been found to increase the frequency of these thoughts (Wenzlaff & Wegner, 2000).

Emotion-Related Variables. The Affective Control Scale (ACS; Williams, Chambless, & Ahrens, 1997) includes 42 items and measures fear of losing control over one's emotions or of one's behavioral reactions to emotions, including anger, depression, anxiety, and positive emotion. The Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004) assesses multiple elements of emotion regulation, including awareness, understanding, and acceptance of emotion; access to emotion regulation strategies; and the ability to act constructively regardless of emotional state. Higher scores on this scale indicate greater difficulties in emotion regulation. The Self-Compassion Scale (Neff, 2003a) assesses several elements of self-compassion, including a kind and nonjudgmental attitude toward oneself when suffering; recognition that one's experiences are part of the larger, more universal human experience; and holding painful thoughts and feelings in balanced awareness, in which they are observed and accepted without judgment, rumination, or self-pity. Self-compassion is conceptualized as distinct from self-esteem because it is nonevaluative (Neff, 2003b). The Toronto Alexithymia Scale (Bagby, Taylor, & Parker, 1993) assesses difficulty identifying and describing feelings and a lack of interest in internal experience. The Trait Meta-Mood Scale (Salovey, Mayer, Goldman, Turvey, & Palfai, 1995) was used to assess emotional intelligence, including attention to, clarity of, and ability to regulate feelings.

Personality-Related Variables. The International Personality Item Pool (IPIP; Goldberg, 1999) provides methods for measuring many personality traits and is available within the public domain. The five scales of the 50-item version of the IPIP measure the broad domains of the five-factor model of personality (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness) and have a mean coefficient alpha of .82 and mean correlations with the corresponding scales on the NEO Personality Inventory—Revised (Costa & McCrae, 1992) of .90. Only neuroticism, extraversion, and openness to experience were assessed here.

Predictions

Mindfulness meditation is believed to cultivate the tendency to observe and label present-moment experiences nonjudgmentally and nonreactively and to lead to improved psychological functioning. Therefore, meditation experience was expected to be positively related to well-being, reflection, self-compassion, emotional intelligence, and openness to experience and negatively related

to psychological symptoms, absentmindedness, rumination, dissociation, thought suppression, fear of affect, difficulties in emotion regulation, alexithymia, and neuroticism as well as unrelated to extraversion. These predictions were tested by correlating these variables with duration of regular meditation practice and by comparing means for meditators and nonmeditators.

Results

Mean Differences Between Meditators and Nonmeditators

As noted earlier, the meditating sample was slightly older and more educated and included more mental health professionals than the nonmeditating sample. Age, education, and mental health work each showed small but statistically significant relationships with some of the mindfulness facets and with a few of our other dependent variables. Therefore, to provide conservative tests of the differences between meditators and nonmeditators, we conducted one-way analyses of covariance, controlling for age, education, and status as a mental health professional. Results can be seen in Table 2. Effect sizes (Cohen's *d*) also are shown. Because not all participants completed all measures, *N*s for these analyses ranged from 120 to 259. The meditating sample scored significantly higher than the nonmeditating sample on total mindfulness and on four of the five facet scores (*observing, describing, nonjudging,* and *nonreactivity*). No group difference was found on the *acting with awareness* facet. As expected, meditators scored significantly lower on psychological symptoms and higher on psychological well-being than nonmeditators. Group differences in the expected directions also were found for cognitive failures, rumination, reflection, thought suppression, difficulties in emotion regulation, and self-compassion. Differences for fear of emotion, alexithymia, emotional intelligence, neuroticism, and openness to experience were in the predicted directions but were not statistically significant. The group difference for dissociation was in the unexpected direction. As predicted, no significant group difference was found for extraversion. Cohen (1977) has described effect sizes of .20, .50, and .80 as small, medium, and large, respectively. For most of our dependent variables, effect sizes were medium or large.

Associations of Meditation Experience With Other Constructs

Partial correlations between extent of meditation experience (duration of regular practice) and other constructs were computed, controlling for age, education, and status as a mental health professional (coded yes or no). To increase the range of variability for all measures, these analyses were conducted in the meditating and nonmeditating samples combined (total $N = 260$). Combining these samples created a distribution in which 30% of participants had meditated never, once, or occasionally; 37% had meditated regularly for up to 10 years; and 33% had done so for more than 10 years. Results can be seen in the final column of Table 2 and show that meditation experience was significantly and positively associated with the mindfulness total score and with each facet of mindfulness. Most of the remaining correlations were significant and in the expected directions. However, contrary to predictions, meditation experience was not significantly associated with dissociation, alexithymia, neuroticism, or emotional intelligence.

Analyses on Demographically Matched Subsamples

Because the meditating and nonmeditating groups were not matched on several demographic variables that showed small but statistically significant relationships with some of the mindfulness facets, all analyses outlined previously were rerun on a subsample of the total group that included all 78 nonmeditators and a demographically matched subset of the meditators. Selection of these

TABLE 2. Univariate Analyses of Covariance and Partial Correlations, Controlling for Age, Education, and Mental Health Work, for Relationships Between Meditation Experience and Other Variables

	Nonmeditators		Meditators			Effect Size	Partial *r* With Meditation
	M	*SD*	*M*	*SD*	*F*	(Cohen's *d*)	Experience
Mindfulness variables							
FFMQ total	138.9	19.2	154.2	17.5	14.99***	.83	.33***
Observe	27.3	6.0	32.2	4.2	37.1***	.95	.35***
Describe	29.7	5.9	32.3	5.2	4.99*	.47	.15*
Act with awareness	28.2	5.7	28.5	4.9	0.00	.06	.15*
Nonjudge	30.2	6.0	33.1	5.3	6.16*	.51	.21**
Nonreact	23.5	4.5	26.1	3.7	11.38***	.63	.34***
Psychological outcome variables							
Symptoms	61.0	14.5	54.4	11.2	5.71*	.51	–.20*
Well-being	42.9	5.6	44.9	4.3	4.21*	.40	.17**
Cognition-related variables							
Cognitive failures	63.5	13.8	59.3	8.3	5.25*	.37	–.24**
Rumination	36.8	9.6	31.5	8.5	8.22**	.58	–.22**
Reflection	41.6	9.6	48.3	7.6	27.05***	.77	.30***
Dissociation	61.1	14.4	63.6	12.7	4.29*	.18	.12
Thought suppression	42.2	12.9	33.7	10.2	11.94**	.73	–.28**
Emotion-related variables							
Fear of emotion	116.1	33.7	104.3	28.9	1.77	.38	–.13*
Difficulties with emotion regulation	62.8	17.0	53.2	9.9	6.03*	.69	–.25**
Self-compassion	89.9	18.3	99.0	15.3	6.14*	.54	.23**
Alexithymia	38.9	10.7	36.4	8.5	.04	.26	.01
Emotional intelligence	119.7	14.1	121.9	10.8	.14	.18	.09
Personality-related variables							
Neuroticism	25.5	7.0	21.8	6.6	1.29	.54	–.09
Extraversion	34.2	7.9	34.8	7.5	0.46	.08	.01
Openness to experience	40.1	6.4	42.8	5.7	3.41	.45	.22*

*$p < .05$. **$p < .01$. ***$p < .001$.

participants was blind with respect to all dependent variables. Because many of the measures had been completed by only one-third of the meditating sample, the nonmeditators were matched to the meditators in a ratio of 1 to 1.5 to allow for adequate power. Alternating nonmeditators were matched with one or two meditators, respectively, who were highly similar in age, education,

and mental health work experience. This process resulted in sample sizes of 118 meditators and 78 nonmeditators. Because not all meditators had completed all measures, sample sizes for the meditators ranged from 32 to 116 for individual analyses.

These demographically matched subsamples did not significantly differ in age, $t(195) = 1.41$, *ns;* gender composition, $\chi^2 = 1.55$, *ns;* ethnicity, $\chi^2 = 2.68$, *ns;* years of education, $t(195) = 1.27$, *ns;* proportion of mental health professionals $\chi^2 = 0.62$, *ns;* or, for those with mental health professional status, years of professional experience, $t(92) = -.58$, *ns*. The meditating and nonmeditating subsamples were largely female (73% vs. 65%), White (95% vs. 89%), middle aged (45.5 vs. 43.1 years), and well educated (18.8 vs. 18.4 years of education). The groups had similar numbers of mental health professionals (53% vs. 47%), with similar experience levels (14.4 vs. 15.5 years).

When analyses previously described were rerun with the demographically matched subsamples, the results were overwhelmingly similar. Most correlations between meditation experience and other constructs showed small changes in magnitude (mostly increases) but maintained their previously identified significance levels. In two cases, correlations were significant at a more stringent level (*describing* facet and rumination). For two other constructs, relationships with meditation experience that had been significant in the total group analyses were no longer significant (*acting with awareness* facet and cognitive failures). Similarly, between-group differences were significant at the same levels as seen with the total sample, with two exceptions. For self-compassion, the group difference was significant at a more stringent level, whereas for dissociation, the group difference was no longer significant. While effect sizes of the between-group analyses tended to decrease slightly, categorical descriptions of the effect sizes (small, medium, large) were maintained for 67% of the between-group analyses and were changed to the next lower category for 33%.

Tests of Mediational Hypotheses

We tested several hypotheses regarding mechanisms by which the practice of mindfulness meditation leads to changes in psychological functioning. The first set of hypotheses stated that a greater tendency to be mindful in daily life should mediate the relationships between meditation experience and each of the three variables described earlier as proposed mindfulness-related mechanisms of change (reduced rumination, reduced fear of emotion, and increased behavioral self-regulation). To test these hypotheses, we conducted three mediation analyses using the regression-based methods described by Baron and Kenny (1986), who suggest that several conditions must be met in order to show support for a mediational hypothesis. The independent variable (IV), mediator, and dependent variable (DV) must be significantly intercorrelated. When the IV and mediator are entered simultaneously into a model predicting the DV, the relationship between the IV and DV must be reduced. We used a *t* test described by MacKinnon, Krull, and Lockwood (2000) for testing the significance of the reduction in this coefficient when the mediator is included in the model. We also calculated z', which tests the significance of the mediated pathway and has been shown to have good statistical power and accurate type I error rates (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002).

To increase the range of variability in meditation experience, we combined all participants in the meditating and nonmeditating samples. In each analysis, the IV was meditation experience (duration of regular practice), and the potential mediator was mindfulness total score (FFMQ). The DV was the proposed mechanism in question. For rumination, we used the rumination score from the RRQ. For fear of emotion, we used the ACS total score. For behavioral self-regulation, we used the Goal Directed Behavior subscale of the DERS, the items of which include difficulty in focusing on the task at hand or getting work done when feeling upset. We conducted a separate test of mediation for each of these three DVs, each of which was significantly intercorrelated with

meditation experience and total mindfulness score. Because of the small but significant relationships between demographic characteristics and other variables, these analyses controlled for age, education, and mental health work.

These analyses are depicted in Figure 1. Results were consistent with the hypothesis that mindfulness is a significant and full mediator of the relationship between meditation experience and each of the three DVs. In each case, the beta coefficient for the relationship between the IV and DV dropped significantly when the mediator entered the model, to values ranging from –.02

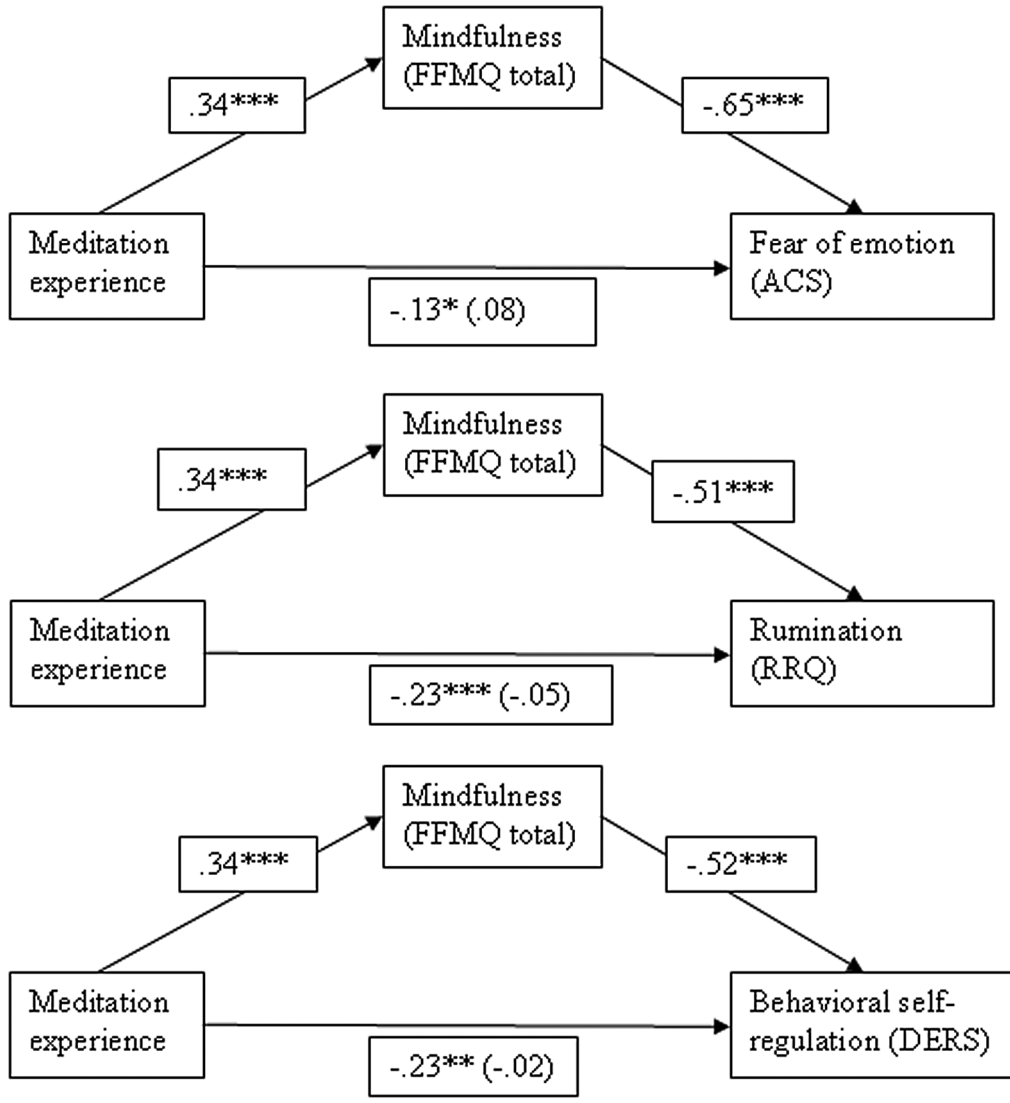

Figure 1. Mediation by mindfulness total score of the relationship between meditation experience and fear of emotions, rumination, and behavioral self-regulation in the combined sample of meditators and nonmeditators. All values are beta coefficients and are controlled for age, education, and mental health work. Coefficients in parentheses show relationships between the independent and dependent variables when the mediator is included in the model.
$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

(*ns*) for behavioral self-regulation to .08 (*ns*) for fear of emotion. These reductions all were significant at $p < .001$ (t values ranging from 4.79 to 4.83). In addition, z' was significant for each of the mediated pathways (for decreased rumination, $z' = 4.62$; for fear of emotion, $z' = 5.04$; and for behavioral self-regulation, $z' = 3.48$; all ps $< .001$). Follow-up regression analyses examining the five mindfulness facets separately showed that *acting with awareness, nonjudging,* and *nonreactivity* all were significant independent predictors of all three DVs. *Describing* was a significant predictor of fear of emotion. The *observing* facet did not contribute significantly to the prediction of the DVs. This may not be surprising, as this facet has previously been shown to be significantly related to psychological functioning only in meditators (Baer et al., 2008).

Because these data are cross sectional, the causal directions of these relationships must be interpreted cautiously. We conducted three tests (one for each of the three variables in question) of an alternative mediational model: that meditation experience leads directly to changes in rumination, fear of emotion, and behavioral self-regulation and that these changes in turn lead to increased mindfulness in daily life. In all three cases, the coefficient for the relationship between the IV (meditation experience) and the DV (mindfulness) was reduced only slightly and remained significant at $p < .001$ when the mediating variable was included in the model. This pattern of findings suggests that there is a direct relationship between meditation experience and mindfulness in daily life that is not mediated by changes in rumination, fear of emotion, or behavioral self-regulation.

In summary, the preceding analyses suggest that meditation practice is associated with mindfulness in daily life, which is related to changes in rumination, fear of emotion, and behavioral self-regulation. Next, we tested whether these three variables help explain the relationship between mindfulness in daily life and general well-being. We tested these three variables in combination, using a regression analysis in which the IV (mindfulness in daily life) and all three potential mediators were entered simultaneously as predictors of the DV (psychological well-being). In this combined model, which can be seen in Figure 2, behavioral self-regulation (Goal Directed Behavior subscale of the DERS) was a nonsignificant predictor of well-being (beta = –.05), whereas fear of emotion (ACS) and rumination (RRQ) each accounted for significant variance in well-being (betas = –.44 and –.18, respectively). The beta coefficient for the relationship between the IV and DV was reduced from .60 ($p < .001$) to .26 ($p < .01$) when all proposed mediators were included in the model. This result is consistent with the hypothesis that both decreased rumination and fear of emotion contribute independently to the mediation of the relationship between mindfulness and well-being. Only partial mediation was shown, however, suggesting that variables not included here also help account for why it is adaptive to be mindful in daily life.

Discussion

The current study addressed questions that have not previously been examined in the mindfulness literature regarding differences between long-term meditators and demographically similar nonmeditators on a wide range of measures of psychological functioning that current conceptualizations suggest should be influenced by the practice of mindfulness meditation. Results showed that, even when controlling for age, education, and work in the mental health field, the two groups differed significantly in the expected directions in most cases. The same pattern of findings was shown for a subset of participants who were matched on all measured demographic variables. These findings suggest that long-term meditators report being more mindful in daily life and score higher on several adaptive characteristics (reflection, self-compassion, well-being) and lower on several maladaptive variables (symptoms, cognitive failures, rumination, thought suppression, difficulties in emotion regulation) than demographically similar nonmeditators. However, a few of these findings were unexpected. For example, meditation experience was not significantly related to alexithymia or emotional intelligence. In both cases, this is probably due

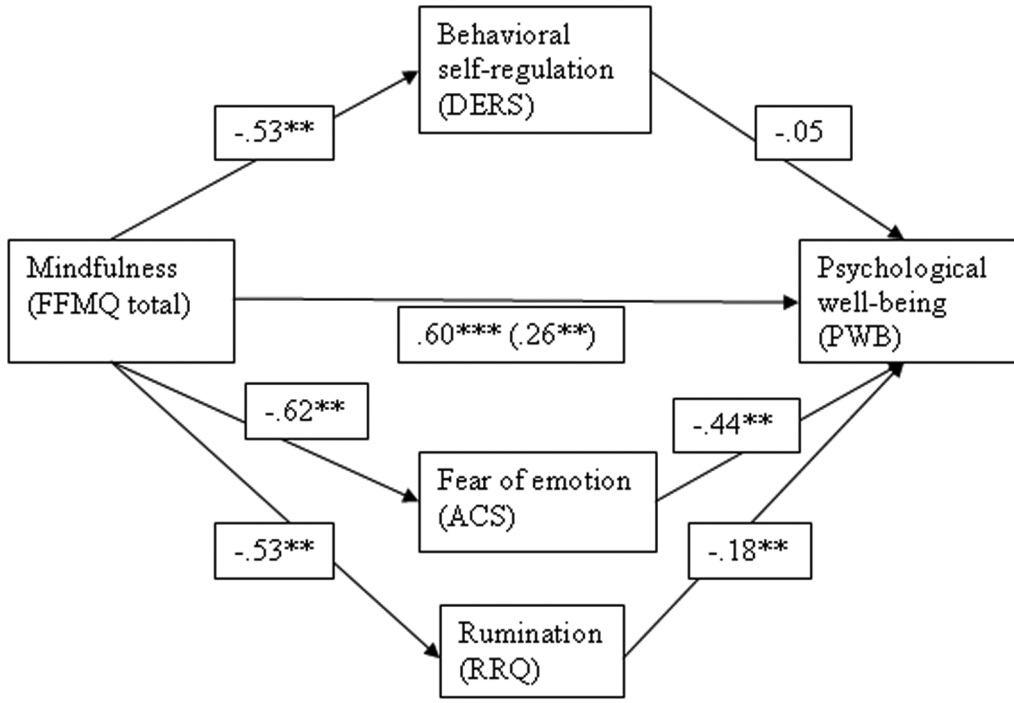

FIGURE 2. Mediation by proposed mechanisms of change of the relationship between mindfulness and psychological well-being. All values are beta coefficients and are controlled for age, education, and mental health work. Values on arrows leading from proposed mediators to well-being show relationships between these variables when the other mediators and meditation experience are included in the model. The coefficient in parentheses shows the relationship between mediation experience and psychological well-being when all mediating variables are included in the model. $^{*}p < .01$. $^{**}p < .001$.

to the extreme scores found in both the meditating and the nonmeditating samples. According to normative data reported by Taylor, Bagby, and Parker (1992), mean score on the alexithymia scale for a general community sample (collapsed across males and females) was 59.43 ($SD = 10.72$). In contrast, our samples' scores were nearly two standard deviations lower at 38.9 (nonmeditating) and 36.4 (meditating). For emotional intelligence, Palmer, Donaldson, and Stough (2002) reported a mean score of 83.51 ($SD = 10.63$) in a general community sample of adults, whereas our samples scored more than two standard deviations higher. It may not be surprising that in well-educated samples, including many mental health professionals, alexithymia scores are very low and emotional intelligence scores very high. This may create floor or ceiling effects such that there is little room for meditation experience to influence alexithymia or emotional intelligence beyond the effects of higher education and work in the mental health field. To a lesser extent, this may be also be true of fear of emotion, for which both of our samples scored approximately one standard deviation below the means for a student sample reported by the developers of this scale.

Our investigation of potential mechanisms by which the practice of mindfulness meditation leads to positive outcomes yielded several interesting findings consistent with previous theoretical literature. First, our findings were consistent with the hypothesis that practicing meditation is associated with higher levels of mindfulness in general daily life, which is related to decreased rumination, decreased fear of emotion, and increased behavioral self-regulation. All three of

these latter variables have been proposed as mechanisms that may help account for the benefits of mindfulness training. Second, our findings suggest that decreased rumination and fear of emotion are partially responsible for the relationships between mindfulness in daily life and well-being. These findings are consistent with ideas articulated by Kabat-Zinn (1982), Linehan (1993a, 1993b), Segal et al. (2002), and Shapiro et al. (2006) and add to the work done by Baer et al. (2008), offering an initial step in the empirical validation of the idea that individuals who practice mindfulness are more likely to observe their thoughts and feelings nonjudgmentally and nonreactively and therefore less likely to ruminate or to fear their emotions and more likely to function adaptively. Clearly, however, future research studies utilizing experimental designs and measuring proposed mindfulness-related mechanisms before, during, and after a mindfulness-based intervention are needed to answer the question of how exactly the practice of mindfulness is exerting its beneficial effects.

Limitations and Future Directions

An important limitation of this study is that data were collected cross sectionally. Most of the relationships examined were consistent with a well-established assumption in meditation traditions: that meditation cultivates mindfulness in daily life, which in turn improves psychological functioning. However, alternative models are possible and can be conclusively evaluated only with longitudinal or experimental designs. One alternative model is that meditation directly cultivates healthy psychological functioning, which in turn facilitates increased mindfulness in daily life. Our cross-sectional tests of mediation did not support this model. Another alternative model is that baseline levels of mindfulness or well-being influence the likelihood of maintaining a meditation practice. Although this model cannot be tested with the current data, Carmody and Baer (2008) tested a similar idea in MBSR participants and found that baseline scores on mindfulness, symptoms, and well-being were unrelated to the amount of reported practice of mindfulness during the 8-week course. Although baseline characteristics did not influence the likelihood of practicing meditation in this context, longitudinal designs are necessary to clarify the sequence of changes that occur with mindfulness training and their relationships to baseline characteristics.

The reliance on self-report methods of assessment is another limitation. Although the measures used here have good support for their reliability and validity, self-report methods can be subject to response biases and demand effects. Long-term meditators are probably well aware of the expected benefits, and this expectation could influence their questionnaire responses. On the other hand, regular meditation requires daily discipline, and it seems unlikely that those not perceiving substantial benefits would have maintained their practice for many years. In addition, mental health professionals also are likely to understand what constitutes healthy cognitive and emotional functioning, and therefore their questionnaire responses may be equally subject to a demand bias. Even so, significant differences between meditators and nonmeditators were found, even with mental health work experience matched or controlled. Therefore, it seems unlikely that our findings can be attributed entirely to the demand characteristics of self-report methods.

It is also possible, however, that some aspects of mindfulness and related variables may be difficult to report on, especially for individuals with no mindfulness training. Additionally, questionnaire items assessing mindfulness or other constructs may be interpreted differently by those with meditation experience and those without. Thus, it is important for future research to investigate alternative methods for assessing levels of mindfulness.

Characteristics of our samples may constitute a third limitation. High levels of education and the proportion of mental health professionals may have created floor or ceiling effects for

a few of the variables we studied and raise the issue of generalizability of the findings to other samples. Although few data are available on the demographic characteristics of regularly meditating samples, Baer et al. (2008) reported that high levels of education, more females than males, and a large majority of White participants are common. The current findings (and those of Baer et al., 2008) suggest that although work in the mental health field is significantly related to some of the variables we examined, the effects of meditation on many these variables are significant even when mental health work is controlled. However, it is important that future research on the effects of meditation investigate more diverse populations. A final concern is that, although a large majority of the meditators reported that their practice was Buddhist based and therefore very likely to involve some form of mindfulness meditation, specific practices can vary across Buddhist traditions (Kabat-Zinn, 2003). Therefore, future studies should request more detailed descriptions of participants' meditation practices.

Although additional work is required to evaluate the generalizability of these findings to clinical samples who practice mindfulness meditation for shorter periods as part of an intervention, the current study offers important suggestions about the impact of meditation practice on psychological functioning and the mechanisms by which meditation and mindfulness lead to beneficial psychological outcomes. These findings may contribute to our understanding of how mindfulness-based treatments lead to improved functioning for individuals seeking help for psychological difficulties.

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Acknowledgments. *Emily L. B. Lykins and Ruth A. Baer, Department of Psychology, University of Kentucky. This project was supported by a grant to Ruth A. Baer from the College of Arts and Sciences at the University of Kentucky. We thank our participants for their generous contributions to this research.*

Correspondence regarding this article should be directed to Ruth A. Baer, PhD, Department of Psychology, 115 Kastle Hall, University of Kentucky, Lexington, KY 40506-0044. E-mail: rbaer@email.uky.edu