

# MINDFULNESS AND RUMINATION: DOES MINDFULNESS TRAINING LEAD TO REDUCTIONS IN THE RUMINATIVE THINKING ASSOCIATED WITH DEPRESSION?

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The purpose of this study was to investigate the impact of mindfulness-based stress reduction (MBSR; Kabat-Zinn, 1982, 1990) training on a self-selected adult community sample in the areas of mindfulness, rumination, depressive symptomatology and overall well-being. Targeting rumination was considered particularly important because a tendency toward rumination in nondepressed populations has been found to be predictive of subsequent onset of depression. As hypothesized, completers of

the MBSR class showed increases in mindfulness and overall wellbeing, and decreases in rumination and symptoms of depression. Limitations of the study are discussed, as are the implications of these findings.

**Key words:** Mindfulness-based stress reduction, mindfulness, rumination, depression

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## INTRODUCTION

Studies examining rumination in healthy individuals with no prior history of depression have demonstrated rumination to be a risk factor for future onset of major depressive disorder, a condition characterized by one or more major depressive episodes.<sup>1-3</sup> For example, in a prospective study, Just and Alloy<sup>1</sup> found that nondepressed participants who reported ruminating in response to their depressive symptoms were more likely to experience a major depressive episode over 18 months than were participants who reported that they distracted themselves from focusing on their symptoms. Both a ruminative response style as measured in a nondepressed state and the use of rumination during the first major depressive episode predicted the severity of that episode. In addition, Nolen-Hoeksema<sup>2</sup> reported findings showing that rumination in response to depressive symptoms predicted new onsets of major depressive episodes.

Given that higher rates of rumination associate with greater vulnerability to depression, it is logical to conclude that reductions in rumination would be protective against later manifestation of a major depressive episode. The practice of meditation has been found to associate with reductions in rumination.<sup>4-6</sup> Mindfulness-based stress reduction (MBSR) has been found to reduce rumination in patients with lifetime mood disorders.<sup>7-9</sup> In addition, mindfulness-based cognitive therapy (MBCT) has been shown to reduce the risk of relapse for patients with three or more previous major depressive episodes.<sup>10,11</sup> The relationship between mindfulness training and rumination in a self-selected adult community sample has not yet been examined. By dem-

onstrating that increases in mindfulness associate with reductions in rumination, the present study aimed to offer preliminary evidence that mindfulness training may be protective against later onset of major depressive disorder.

## Rumination Defined

Rumination is a mental process conceptualized as a particular way of relating to the contents of the mind.<sup>9</sup> Definitions of rumination have included passively focusing one's attention on a negative emotional state, such as depression,<sup>12</sup> intrusive thinking about a distressing event,<sup>13</sup> distress associated with thoughts about recent negative events (O. Luminet, written communication, October 2004), searching for the meaning of negative experiences, and thinking about what can be done to change one's situation in regard to negative events.<sup>14</sup> A definition of rumination that is pertinent to this study was developed by Nolen-Hoeksema as part of her response styles theory of depression.<sup>12</sup> Within this theory, rumination is defined as a coping response to negative mood involving self-focused attention, characterized by a repetitive and passive focus on one's negative emotions.<sup>2,12,15</sup>

## Ruminative Style as Risk Factor for Future Major Depressive Episode

The response styles theory of depression argues that individuals have consistent styles of responding to depressed mood and that the specific style of responding influences the duration and severity of the depressed mood.<sup>12</sup> The ruminative response style is a pattern in which the individual's attention, thoughts, and behaviors are focused on his or her negative emotional state, inhibiting any action that may potentially distract from the depressed mood. The ruminative response style has been found to predict new onsets of major depressive episodes among healthy individuals.<sup>1-3</sup>

Considering that a tendency to ruminate may be a risk factor for later onset of major depressive disorder, one way to protect vulnerable individuals would be to teach them a different way to

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respond to depressed moods, other than rumination. Mindfulness training may provide just such an alternative. In fact, recent research suggests that mindfulness meditation compared with distractive behaviors more successfully alleviates dysphoric mood.<sup>16</sup> In that study, a dysphoric mood was induced in 139 female and 38 male participants, who were then randomly assigned to one of three conditions involving rumination, distraction, or meditation. As predicted, participants who were instructed to meditate reported significantly lower levels of negative mood than those in either of the two other conditions. Distraction was associated with a lessening of dysphoric mood when compared with rumination, but was not as effective as mindfulness meditation.<sup>16</sup>

### **Defining Mindfulness**

Mindfulness has been described both as a practice and as a state of mind. The practice of mindfulness, usually taught through meditation, consists of learning to intentionally bring one's attention back to the internal and external experiences occurring in the present moment.<sup>19</sup> Conceptualized as a mental state, mindfulness is synonymous with awareness of the present moment, in which each arising occurrence is experienced with curiosity and awe, as if for the first time.<sup>18</sup> Although the mind has a natural tendency to dwell in the past or worry about the future, mindfulness promotes a gentle shifting of the mind back to the immediate experience. Kabat-Zinn describes mindfulness simply as, "paying attention in a particular way: on purpose, in the present moment."<sup>19</sup> (p.4)

Mindfulness training aims to teach people to "decenter" from their thoughts and emotions, that is, to see their thoughts and feelings come and go without attaching any important truth or meaning to them.<sup>20</sup> Increasing mindfulness is one presumed target of mindfulness-based interventions, but whether mindfulness actually changes from these interventions remains relatively unstudied. One of the aims of the current study was to address this question by examining in an adult community sample whether completion of a MBSR program is associated with increased mindfulness.

### **Mindfulness-Based Stress Reduction**

The MBSR program is a well-researched method of mindfulness training.<sup>7,8</sup> Kabat-Zinn created this eight-week program to teach the practice of mindfulness meditation to treatment-resistant, chronically ill medical patients. The MBSR program consists of eight classes, during which meditation instruction is provided. The teaching includes various types of meditation, in the form of a body scan meditation, hatha yoga postures, and sitting meditation. In addition, students are given audio tapes or compact discs of guided meditation, which are intended to be used for practice on their own. Participants are instructed to practice for 45 minutes each day of the eight weeks.

### **Clinical Applications of MBSR**

Mindfulness-based stress reduction has been found to alleviate numerous clinical disorders, including chronic pain,<sup>21</sup> anxiety,<sup>22</sup> depression,<sup>22</sup> binge eating,<sup>23</sup> and stress.<sup>24</sup> Mindfulness training in the form of MBCT, an adaptation of MBSR for

depression, has been shown to protect against depressive relapse.<sup>10,11</sup> Critical reviews of the clinical outcome literature on mindfulness and meditation include Bishop (2002),<sup>25</sup> Bonadonna (2003),<sup>26</sup> Baer (2003),<sup>17</sup> Grossman et al (2004),<sup>27</sup> and Toneatto and Nguyen (2007).<sup>28</sup>

Bishop<sup>25</sup> reviewed the literature available on MBSR and concluded that there was an overall lack of methodologically sound research. He did not offer a strong endorsement of the approach but suggested that there was evidence of promise that he concluded was worthy of more thorough investigation.

Bonadonna<sup>26</sup> reviewed the clinical impact of meditation on chronic illness. Her review concluded that meditation had a positive effect in general in its beneficial impact on a broad spectrum of physical and psychological symptoms and syndromes, including reduced anxiety, pain, and depression, enhanced mood and self-esteem, and decreased stress.

Baer<sup>17</sup> reviewed 22 studies that used either MBSR or MBCT. Conditions treated included various physical and psychological problems such as anxiety, depression, binge eating, chronic pain, fibromyalgia, psoriasis, stress related to cancer, and medical and psychological functioning among nondepressed samples. The review summarized conceptual approaches to teaching mindfulness and empirical studies on the effectiveness of mindfulness-based interventions. Meta-analytic techniques were incorporated to quantify findings across studies. Although Baer noted that the literature lacked many well-designed studies, she concluded that mindfulness-based interventions may help to alleviate a variety of mental health problems and to improve psychological functioning. This review recommended continued research with more rigorous methodology.

Grossman et al<sup>27</sup> conducted a meta-analysis of 20 empirical studies of MBSR, both controlled and observational. Studies reviewed covered a wide range of clinical populations, including pain, cancer, heart disease, depression, and anxiety, as well as stressed nonclinical groups. The analysis found both controlled and uncontrolled studies to show similar effect sizes of approximately 0.5 ( $P < .001$ ) with homogeneity of distribution. The authors interpreted these results to suggest that MBSR may be beneficial to a broad range of clinical and nonclinical populations.

Toneatto and Nguyen<sup>28</sup> reviewed the literature on the impact of MBSR on depression and anxiety symptoms. The review included only controlled studies and examined the following variables: anxiety or depression outcomes after the MBSR program, measurement of compliance with MBSR instructions, type of control group included, type of clinical population studied, and length of follow-up. The authors reported that the beneficial effect of MBSR on depression and anxiety was equivocal and concluded that MBSR does not have a reliable effect on depression and anxiety.

### **MBSR for Rumination**

Evidence suggesting that mindfulness training may lead to reductions in rumination provides initial support for a primary hypothesis of this study that MBSR will be associated with reductions in rumination. Teasdale et al<sup>29</sup> identified ruminative thought patterns as central to the maladaptive cognitive processes that typically precede depressive relapse. This idea sup-

ports the theory that depressive relapse could be prevented by replacing reactive, ruminative thought processes with a more decentered, mindful way of relating to cognitions.<sup>30</sup> Consistent with this supposition, MBCT was found to prevent depressive relapse by 44% in chronically depressed patients with a history of three or more episodes of depression.<sup>10,11,31</sup>

Further support for the proposition that mindfulness training may decrease ruminative thought patterns emerged in a controlled study when Ramel et al<sup>9</sup> found MBSR training to reduce rumination in patients with lifetime mood disorders. Ramel et al<sup>9</sup> hypothesized that the primary change in mindfulness meditation involved reductions in ruminative tendencies. The authors examined the effects of mindfulness training on affective symptoms (depression and anxiety), dysfunctional attitudes, and rumination by assessing a group of participants with lifetime mood disorders before and after an eight-week course in MBSR, as compared with a wait-listed sample. Results suggested that providing mindfulness training to persons with lifetime depression and anxiety disorders leads to decreases in ruminative thinking, even after controlling for reductions in affective symptoms and dysfunctional beliefs. Regression analyses indicated that the more mindfulness meditation had reportedly been practiced, the less rumination was reported at follow-up assessment. In response to these findings, Ramel et al<sup>9</sup> offered the suggestion that mindfulness meditation may teach self-regulatory strategies that help modify depressogenic cognitive variables such as rumination.

### Research Aims

The aim of the present study was to examine the impact of MBSR training on a self-selected adult community sample in the areas of mindfulness, rumination, depressive symptomatology, and overall well-being. Targeting rumination was considered particularly important because rumination has been found to be a risk factor for depression in nondepressed populations. Reductions in rumination have been tied to improvement and prevention of depression, particularly in people who have been depressed three or more times.<sup>10,11,31</sup> Although Ramel et al<sup>9</sup> found MBSR to successfully reduce rumination in a clinical sample of participants with lifetime mood disorders, no one has yet evaluated rumination in a self-selected adult community sample naturally presenting to MBSR. Primary hypotheses included the following: (1) experiences of mindfulness will increase from pre-MBSR to post-MBSR, (2) rumination will decrease from pre-MBSR to post-MBSR, and (3) changes in mindfulness will be inversely associated with changes in rumination. Secondary hypotheses were that (1) depressive symptoms will decrease from pre-MBSR to post-MBSR, and (2) overall well-being will increase from pre-MBSR to post-MBSR.

## METHOD

### Study Design

This pilot study was designed to examine within-group changes from pre-MBSR to post-MBSR intervention. No control group was included. Pre-MBSR and post-MBSR data were collected with psychometrically sound measures and compared. The outcomes of interest were changes in the scores on measures of

mindfulness, rumination, depressive symptomatology, and overall well-being.

### Participants

This study was approved by the appropriate institutional review boards prior to the onset of data collection. Participants were drawn from a heterogeneous population of individuals seeking support from the MBSR program for various medical and psychological problems. Due to the mixed nature of the population, neither “healthy” nor “clinical” seemed appropriate descriptors of the sample. Therefore, the study participants are described as a “self-selected adult community sample.” Originally, 34 participants read and signed consent forms documenting their informed consent for study participation prior to completing the study questionnaires at the beginning of the first class. Twenty-two persons completed the study, drawn from three different MBSR classes, one of which was offered through an integrative medicine program and two that were taught at a stress management training program. Three groups were examined to obtain a larger number of participants. The two instructors of these groups were each trained and certified to teach MBSR and had been teaching for over 10 years at the time of the study. The three groups each had the same curriculum, modeled as previously described after Kabat-Zinn’s program.<sup>7,8</sup>

Of the participants who had signed up for the classes, all were given the opportunity to participate in the study. Questionnaires were completed by 34 participants at the time of class one, 22 of whom attended the final class eight weeks later. All 22 of these participants completed the follow-up questionnaires. The 22 final participants’ ages ranged from 24 to 63 years (mean = 44, SD = 13). All of the participants were Caucasian. Reported occupations included artist, businessman, consultant, engineer, finance, librarian, marketing, mother, physician, research, registered nurse, student, and teacher. Two participants reported that they were currently unemployed. The Beck Depression Inventory (BDI) was administered to assess depressive symptoms. In a

**Table 1.** Descriptive Statistics for Demographic Characteristics (N = 22)

Characteristics	Frequency	Percent
Sex		
Male	10	45.5
Female	12	54.5
Education		
High school	1	4.3
Some college	2	8.7
Bachelor’s degree	5	21.7
Graduate degree	14	60.9
Total household income		
<\$25,000	1	4.3
\$25,000-\$39,999	3	13.0
\$40,000-\$79,999	2	8.7
\$80,000-\$99,999	2	8.7
>\$100,000	14	60.9

community sample, scores of 21 or less suggest the absence of significant mood disturbances. Mean BDI pretest scores showed that most participants were not experiencing depressive symptoms (mean = 13.29, SD = 9.07) at the time of the study. It is notable that this sample consisted mostly of highly educated (61% graduate degrees) and high socioeconomic status (61% over \$100,000 income) individuals. A comparison of the demographic characteristics of the three groups used one-way analysis of variance on continuous variables and chi-square tests on categorical variables. No significant differences were found in the demographic characteristics across the three groups. A summary of the demographic characteristics appears in Table 1.

### The MBSR Program

The MBSR program consisted of eight classes, during which formal meditation instruction was provided. Participants were instructed to practice meditating for 45 minutes each day of the eight weeks. For the first two weeks, participants were instructed to listen to the recording of the body scan meditation, during which the listener was instructed to fully experience physical sensations while also maintaining awareness of their breath. For weeks three and four, the body scan was alternated every other day with the recording of guided hatha yoga postures, which instructed the listener to move in various yoga postures while remaining focused on physical sensations, including the breath. For weeks five and six, patients were asked to practice sitting meditation, during which patients sat on the floor or in a chair, completely still, for the full 45 minutes. During the sitting meditation, the participant was asked to focus on his or her breathing, bodily sensations, sounds, thoughts, and feelings as they arose. For the final two weeks, students were instructed to practice an individualized mix of meditation practices every day for 45 minutes.

In addition to meditation training, MBSR teachers provided lectures and led group discussion on the philosophy behind mindfulness practice. Students were also instructed to read Kabat-Zinn's *Full Catastrophe Living*.<sup>8</sup> Lectures were based on Kabat-Zinn's seven attitudinal factors of mindfulness training: nonjudging, patience, beginner's mind, trust, nonstriving, acceptance, and letting go.

### Measures

**Demographic questionnaire.** The participants' demographic characteristics were assessed. Each participant was asked to describe his/her age, sex, ethnic background, years of completed education, employment status, and household income.

**Kentucky Inventory of Mindfulness Skills.** Mindfulness was measured with the Kentucky Inventory of Mindfulness Skills (KIMS),<sup>32</sup> which consists of 39 items that are rated on a five-point Likert scale ranging from one ("never" or "very rarely true") to five ("almost always" or "always true") according to "your own opinion about what is generally true for you." The inventory was designed to measure four mindfulness skills through the following subscales: act with awareness, accept without judgment, observe, and describe. The act with awareness subscale assessed the individual's experience of being absorbed in specific activities,

focusing on one thing at a time. The accept without judgment subscale emphasized taking a nonjudgmental or nonevaluative stance about present-moment experience. The observe subscale emphasized noticing or attending to both internal and external phenomena. Finally, the describe subscale assessed the ability to label or note observed phenomena by covertly applying words (eg, "I'm good at thinking of words to describe my perceptions, such as how things taste, smell, or sound").

The KIMS has shown satisfactory psychometric properties. It was found to have an overall internal consistency of .87.<sup>33</sup> Test-retest reliability for the observe, describe, act with awareness, and accept without judgment subscale scores were .65, .81, .86, and .83, respectively, indicating adequate to good test-retest reliability. Paired sample *t* tests showed no significant differences between test and retest scores. Content validity evaluation yielded high ratings of item clarity and representation of mindfulness skills.<sup>32</sup>

**The Rumination-Reflection Questionnaire.** The Rumination-Reflection Questionnaire (RRQ) was used to assess rumination.<sup>34</sup> The questionnaire consists of two scales: a rumination scale and a reflection scale. Because the reflection scale was not relevant to the present study, only the rumination scale was used. Items on the RRQ rumination scale were rated on a five-point Likert scale ranging from one ("strongly disagree") to five ("strongly agree"). The scale contained 10 items (eg, "My attention is often focused on aspects of myself I wish I'd stop thinking about") consisting of negatively toned rumination items that reflect the trait of neuroticism and share a focus on neurotic self-attentiveness. Higher rumination scores indicated greater rumination. Trapnell and Campbell<sup>38</sup> found the RRQ to demonstrate good convergent and discriminant validity and excellent internal consistency, as Cronbach's  $\alpha$  estimates exceeded .88.

**Beck Depression Inventory.** Depressive symptomatology was assessed with the BDI.<sup>35,36</sup> This 21-item measure evaluates symptoms within the cognitive, affective, motivational, and behavioral components of depression.<sup>37,38</sup> In a meta-analysis of generalized reliability estimates of the BDI across studies, Yin and Fan<sup>39</sup> found an internal consistency of .82 and test-retest reliability .69.

**The Schwartz Outcomes Scale.** The Schwartz Outcomes Scale<sup>40</sup> (SOS-10) included 10 statements designed to reflect optimal mental health, which were rated on a seven-point Likert scale ranging from zero ("never") to six ("all of the time" or "nearly all of the time"). This scale was developed as a brief outcome measure to identify changes in people's lives that might be seen as a result of successful mental health treatment (eg, "I am generally satisfied with my psychological health"). Strong convergent validity and divergent validity for the SOS-10 were established with measures of hopelessness, self-esteem, positive and negative affect, mental health, fatigue, life satisfaction, psychiatric symptoms, and desire to live. Also, this scale has shown strong internal consistency (Cronbach's  $\alpha$  = .96) and one-week



test-retest reliability of .87, which was demonstrated in a nonpatient population.<sup>40</sup>

**MBSR compliance form.** The MBSR compliance form was created for the purpose of this study. The form consists of two questions, one that assessed the average number of days that each of the participants meditated each week, and the other assessed the length of time that they mediated at each sitting.

### Procedure

The MBSR classes approached in this study were the routine MBSR classes offered to the community as previously described. Prior to the beginning of the first MBSR class, MBSR participants were offered the opportunity to volunteer to participate in the study. Those who provided informed consent were given the questionnaires to complete before the class began. Participants had no further contact with the investigator until the eighth and final class of the MBSR program. At the end of the eighth class, all participants who had previously completed the questionnaires were asked to complete them again. In addition to the original questionnaires, the MBSR compliance form was distributed at this time to help assess how long and how often participants meditated.

### Statistical Analysis

Changes in mindfulness, rumination, symptoms of depression, and overall well-being were tested with paired sample *t* tests, with each person serving as his or her own control. One-tailed tests were used to determine whether scores differed in the hypothesized direction.

## RESULTS

### Significance of the Pretest to Posttest Changes

The *t* test results are presented in Table 2. Significant pretest to posttest increases were found on the KIMS total score ( $P = .001$ ),

the KIMS act with awareness subscale ( $P = .001$ ), the KIMS observe subscale ( $P = .001$ ), and the SOS-10 ( $P = .001$ ), suggesting overall increases in mindfulness and well-being. No significant differences were found on the KIMS accept without judgment subscale or on the describe subscale. Significant pretest to posttest reductions were found on the RRQ rumination scale ( $P = .017$ ), and the BDI ( $P = .001$ ).

### Effect Sizes

The majority of the effect sizes met or exceeded Cohen's standard of 0.50 for a medium effect. The KIMS total score showed a large effect size ( $d = 1.17$ ), as did the KIMS act with awareness subscale ( $d = .86$ ), the KIMS observe subscale ( $d = 1.38$ ), the BDI ( $d = .91$ ), and the SOS-10 ( $d = .78$ ). The RRQ rumination scale showed a medium effect size ( $d = .50$ ), whereas the KIMS accept without judgment subscale ( $d = .42$ ) and the KIMS describe subscale ( $d = .40$ ) showed small to medium effect sizes.

### Relationship Between Changes in Mindfulness and Rumination

The Spearman correlation coefficient of  $-0.34$  that was found between changes in mindfulness and changes in rumination did not attain statistical significance ( $P = .068$ ), but showed a trend for a negative relationship in which increased mindfulness was associated with decreased rumination.

### Analysis of Dropouts

Pretest scores of participants who dropped out of the study and of those who completed it were compared by using *t* test and chi-square analyses for continuous and dichotomous variables, respectively. Their scores were compared on the following measures: demographic characteristics (age, sex, race, education, and income), KIMS total score, RRQ rumination scale score, BDI score, and SOS-10 score. These analyses revealed no significant differences.

**Table 2.** Comparison of Scores on Pretest and Posttest Measures

Measure	Pre-MBSR		Post-MBSR		<i>N</i> <sup>a</sup>	<i>t</i> Test	<i>d</i> <sup>b</sup>
	Mean	SD	Mean	SD			
KIMS total score	119.27	17.59	138.68	18.53	21	5.48**	1.17
KIMS awareness scale	27.09	5.54	31.82	5.60	21	4.05**	0.86
KIMS accept scale	30.32	8.12	32.36	6.41	21	1.96	0.42
KIMS observe scale	37.18	8.53	45.36	7.32	21	6.46**	1.38
KIMS describe scale	25.50	6.44	28.27	8.08	21	2.07	0.40
RRQ rumination scale	36.19	7.05	32.24	8.87	20	-2.28*	0.50
BDI score	13.29	9.07	7.24	7.32	20	-4.16**	0.91
SOS-10 score	35.00	10.55	42.76	9.78	20	3.56**	0.78

MBSR, mindfulness-based stress reduction; KIMS, Kentucky Inventory of Mindfulness Skills; RRQ, Rumination Reflection Questionnaire; BDI, Beck Depression Inventory; SOS-10, Schwartz Outcome Scale.

\* $P < .05$ .

\*\* $P < .01$ .

<sup>a</sup>Total sample.

<sup>b</sup>Cohen's *d* effect size.

## DISCUSSION

This study examines the impact of MBSR training on mindfulness, rumination, depressive symptomatology, and overall well-being. Focusing on rumination was considered particularly important because a tendency toward rumination in nondepressed populations has been found to be a risk factor for subsequent onset of depression. The findings of this pilot study suggested that changes on several measures occurred between the pretest and posttest in the expected directions. Specifically, as hypothesized, experiences of mindfulness were increased from pre-MBSR to post-MBSR; rumination decreased from pre-MBSR to post-MBSR; depressive symptoms decreased from pre-MBSR to post-MBSR; and overall well-being increased from pre-MBSR to post-MBSR.

Of particular interest were the findings that participants who completed MBSR training reported significant increases in mindfulness skills and significant decreases in rumination. Although it has been presumed in previous research that MBSR leads to greater mindfulness, there is limited research to support this presumption,<sup>41</sup> in part due to the lack of clinically validated instruments available to measure the construct of mindfulness. The first psychometrically sound mindfulness scale was not developed until 2001.<sup>33</sup> The inclusion in this study of the KIMS, a relatively well-tested mindfulness measure, provided results consistent with the possibility that MBSR actually increases mindfulness. The findings also offer further validation to the measure itself. The KIMS was able to show significant change in mindfulness despite the small sample size.

The finding that participation in MBSR training is associated with significant decreases in rumination in a self-selected adult sample expands upon previous evidence that MBSR is associated with reductions in rumination in a mood disordered sample.<sup>9</sup> However, contrary to our expectations, the current study did not find that increases in mindfulness were significantly associated with decreases in rumination, suggesting that this theory may require further consideration. Although there was a moderate effect size, the relationship did not reach statistical significance, possibly due to low power/small sample size or possibly due to revisions needed in the theory. Further research is necessary to identify the mechanism of change accountable for reductions in rumination and to better understand whether changes in rumination are in fact due to increases in mindfulness.

## Limitations

Research on MBSR classes is difficult given that the classes are demanding and tend to have high dropout rates, as noted in previous research.<sup>42</sup> The present pilot study was limited by the lack of a control group, leaving the possibility open that any changes found may have been due to factors other than the intervention, such as the passage of time, other clinical interventions, or personal changes in lifestyle that were not accounted for. Therefore, no conclusions can be made about whether the changes in the measures from pretest to posttest were actually caused by receiving MBSR training, as such conclusions will require research using a randomized control study design.

Another limitation was the small, homogeneous convenience sample. The majority of participants were highly educated, high socioeconomic status individuals, and therefore the findings of the current study cannot be generalized to other kinds of com-

munity samples. Future research should not only attempt to evaluate the impact of MBSR across a larger and more diverse sample, but should also evaluate whether there are cultural or socioeconomic factors that influence the effects of this intervention. In addition, compliance with the intervention was not adequately assessed. Attendance records were not kept and responses to the MBSR compliance form were likely skewed because the two global items that made up the measure were imprecise and vulnerable to retrospective biases, positive impression biases, and reductions of cognitive dissonance. Furthermore, the use of self-report measures is limited by their potential for inadequate recall and response bias. These challenges must be overcome in future research.

## CONCLUSIONS

A tendency to ruminate in healthy, nondepressed individuals in response to a negative mood has been identified as a risk factor for future onset of major depressive disorder. One way to protect vulnerable individuals would be to teach them a different way to respond to depressed moods, other than rumination. Mindfulness training may provide just such an alternative. Although future research would be needed to defend this theory, the current study offers some preliminary support to the notion that learning to respond more mindfully to one's emotions may decrease the likelihood that a negative mood will spiral into a major depressive episode. Considering that the current study found rumination scores in a small community sample to be significantly reduced post-MBSR training, it is conceivable that mindfulness training may potentially serve as a preventative intervention in nonclinical populations by lowering the risk of depression. It is our hope that future research will continue to investigate this theory.

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