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*J Holist Nurs* published online 1 November 2010  
DOI: 10.1177/0898010110385938

The online version of this article can be found at:  
<http://jhn.sagepub.com/content/early/2010/10/31/0898010110385938>

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## Research

# Feasibility of a Mindfulness-Based Stress Reduction Program for Early-Stage Breast Cancer Survivors

Cecile A. Lengacher, PhD, RN, Versie Johnson-Mallard, ARNP, PhD, Michelle Barta, BS, MPH, Shirley Fitzgerald, PhD, Manolete S. Moscoso, PhD, PA, Janice Post-White, RN, PhD, FAAN, Paul B. Jacobsen, PhD, Melissa Molinari Shelton, RN, MS, Nancy Le, BS, Pinky Budhrani, BS, RN, Matthew Goodman, MD, and Kevin E. Kip, PhD

jhn

Journal of Holistic Nursing  
American Holistic Nurses Association  
Volume XX Number X  
Month XXXX xx-xx  
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10.1177/0898010110385938  
<http://jhn.sagepub.com>

**Purpose:** To assess the feasibility of whether mindfulness-based stress reduction (MBSR) has a positive effect on breast cancer survivors' psychological status, psychosocial characteristics, symptoms, and quality of life (QOL) during the critical transition period from end of treatment to resumption of daily activities. **Design:** Single-group, quasi-experimental, pretest–posttest design. **Method:** A sample of 19 women who completed breast cancer treatment with lumpectomy, radiation, and/or chemotherapy was recruited from the Moffitt Cancer Center and Research Institute, a National Cancer Institute–designated cancer center, and the University of South Florida. The authors assessed the feasibility, compliance, and whether an 8-week MBSR program positively influenced changes in psychological status (fear of recurrence, perceived stress, anxiety, depression), psychosocial characteristics (optimism, social support, spirituality), physical symptoms, and QOL. **Findings:** Seventeen women (89.5%) completed the study. The mean age was 57 years; the majority of participants (94%) were White. The estimated compliance rate for the program was 67%. Paired *t* tests indicated significant improvements fear of recurrence, perceived stress, anxiety, depression, and QOL through MBSR participation. **Conclusions:** Participants enrolled in the MBSR classes generally were compliant. Significant improvement in psychological status, symptoms, and QOL can be achieved with MBSR use in this population.

**Keywords:** cancer survivors; meditation; pain; psychological well-being; quality of life; stress

Women with breast cancer (BC) are at high risk for psychological distress during the time from end of treatment to posttreatment survivorship. This critical transition period is defined as the time when formal adjuvant therapies and close medical and nursing support end and when the patient seeks to resume normal daily life and activities. Although research indicates that BC survivors adjust over time to disease-related emotional distress, fear of recurrence chronically plagues 60% to 99% of these women (Polinsky, 1994; Vickberg, Bovbjerg, DuHamel, Currie, & Redd, 2000). In a cohort of 72 women with BC, fear of the future remained elevated at 11 months, 15 months, and the

6-year follow-up after diagnosis (Lebel, Rosberger, Edgar, & Devins, 2007). In another study among BC survivors, 70% continued to fear the possibility of recurrence 5 years after diagnosis (Mast, 1998).

Stress can influence health behaviors, thus leading to changes in quality of life (QOL) and functional

**Authors' Note:** The authors had funding support from the Oncology Nursing Society Foundation/Aventis Pharmaceuticals Oncology Nursing Research Grant and Moffitt Cancer Center and Research Foundation. Please address correspondence to Cecile A. Lengacher, University of South Florida, College of Nursing, MDC 22, 12901 Bruce B. Downs Boulevard, Tampa, FL 33612-4476; e-mail: [clengach@health.usf.edu](mailto:clengach@health.usf.edu).

status (Luecken & Compas, 2002; Simonton & Sherman, 1998). Evidence suggests that in early-stage BC, women tend to exaggerate their risk of recurrence and mortality, resulting in deleterious psychological stress (Rakovitch et al., 2003). In a study of 265 cancer patients, BC patients reported increased psychosocial distress during and shortly after treatment (Sehlen et al., 2003). Not only do survivors report fear of recurrence, anxiety and depression, these fears exist up to 2 years posttreatment (Bleiker, Pouwer, van der Ploeg, Leer, & Ader, 2000) and remain prevalent in 50% of women treated for early-stage BC (Fulton, 1997).

This reported psychological distress often leads to lower QOL (Meneses et al., 2007). Survivors who generally report poorer physical functioning (Casso, Buist, & Taplin, 2004; Dorval, Maunsell, Deschenes, Brisson, & Masse, 1998; Ganz et al., 2002) are at risk for lower QOL because of greater uncertainty, decreased physical functioning with older age (Tomich & Helgeson, 2002), depression (Bloom, Stewart, Chang, & Banks, 2004), and physical symptoms. Dispositional optimism has been associated with decreased symptoms of anxiety and depression while increasing QOL (Carver et al., 1993). Other resources reported to be related to emotional adaptation and QOL in women with BC are social support and spirituality (Lewis et al., 2001). Social support has been found to lower levels of anxiety and depression (Finch, Okun, Pool, & Ruehlman, 1999; Trunzo & Pinto, 2003), and spirituality has been associated with and positively affects adaptation to illness (Koenig, 2000).

## Mindfulness-Based Stress Reduction (MBSR)

MBSR is a form of complementary and alternative medicine that combines the techniques of meditation, body scan, and yoga and has been found to be effective for patients with cancer. As a clinical program, MBSR provides systematic training to promote stress reduction by self-regulating arousal to stress (Kabat-Zinn, Lipworth, & Burney, 1992). Several clinical studies have shown the usefulness of MBSR in improving psychological and physical symptoms and QOL. The use of MBSR for patients with cancer has been one of the most common clinical populations investigated. In a randomized

controlled trial (RCT) of 90 cancer outpatients, those receiving MBSR had a 31% decrease in symptoms of stress and a 65% decrease in total mood disturbance; these improvements remained stable at a 6-month follow-up (Carlson, Ursuliak, Goodey, Angen, & Specca, 2001; Specca, Carlson, Goodey, & Angen, 2000). Results of a recent RCT among BC patients transitioning off treatment showed that MBSR was effective at reducing psychological symptoms such as depression, anxiety, fear of recurrence, and improving energy and physical functioning (Lengacher et al., 2009).

A theoretical logic model was created based on the psychosocial nursing research model developed by (Evans, 1992), and serves as a heuristic device for research. Adapting this model, our exploratory and theoretical logic model postulates that the MBSR(BC) program will influence psychological status, physical symptoms, and QOL following completion of BC treatment and how MBSR(BC) may effectively improve short- and long-term outcomes. With this model, we hypothesized that MBSR(BC), a stress- and anxiety-reducing technique, would have a positive influence on psychological status (i.e., fear of recurrence, perceived stress, anxiety, depression), physical symptoms, and QOL immediately following the MBSR(BC) program. We also postulated that, to achieve maximum benefit from the MBSR(BC) program, practice and proficiency in mindfulness is a critically important element.

## Method

### Design, Sample, and Setting

A single group, pretest–posttest design was used to assess the effectiveness of the MBSR(BC) program among 19 BC patients. Women aged 21 years or older diagnosed with Stage 0, I, II, or III BC (who had undergone lumpectomy, completed adjuvant radiation therapy and/or chemotherapy and were at end of treatment to 1 year posttreatment) were referred by clinic nurses and physicians to the principal investigator, who then approached them in person for recruitment into the study. Patients with Stage IV BC, history of mastectomy, current severe psychiatric diagnosis, and those receiving treatment for recurrent BC were excluded.

## Procedures

Patients who expressed an interest in the study were invited to an orientation session where informed consent was obtained and baseline data were collected on measures of psychological status (fear of recurrence, perceived stress, anxiety, depression), psychosocial characteristics (optimism, social support and spirituality), physical symptoms, and QOL. Participants then attended an 8-week MBSR(BC) program taught by a licensed clinical psychologist who was trained in MBSR. The same measures of psychological status, psychosocial characteristics, symptoms, and QOL were completed at the end of the 8-week program.

## MBSR(BC) Intervention

The original 8-week MBSR program, developed by Kabat-Zinn (Kabat-Zinn et al., 1985; Kabat-Zinn et al., 1992), trains participants to reduce their perceived level of stress by self-regulating arousal to stressful circumstances or symptoms. The intervention consists of three processes and components: (a) educational material related to relaxation, meditation, and the mind–body connection; (b) practice of meditation in group meetings and homework assignments; and (c) group processes related to barriers to the practice of meditation, application of mindfulness in daily situations, and supportive interaction between group members. Participants receive meditative training in four types of meditation techniques that emphasize focusing attention on the breath. The first is sitting meditation, involving an awareness of bodily sensations, thoughts, and emotions while returning the focus of attention to breathing. The second meditative form is the body scan, consisting of observing any sensations in the various regions of the body from the head to toes and back again, returning the focus of attention to breathing. The third form is Gentle Hatha Yoga, consisting of various postures and stretches that increase awareness and balance and strengthen the musculoskeletal system. The last form is practice of walking meditation, which increases awareness with walking activity. As stated above, MBSR is an 8-week program that consists of weekly 2-hour sessions. MBSR(BC) in this study was adapted for consideration of the BC survivors' health status and symptom management experience for specific psychological and physical symptoms. All participants were requested to formally meditate for a minimum of 45 minutes per day, 6 days per week.

Compliance to the intervention was determined by the number of classes attended, completion of diaries, and daily minutes practiced for each intervention. Study participants were reminded during each class session by the MBSR class instructor to attend next week's class, and daily diaries were given to participants to fill out at home and were collected at each class session, which helped reinforce the importance of practice. A trained research associate completed an observational checklist for assessment of compliance to these items. Tapes were made available to assist patients with meditation, yoga, and body scan.

## Measurements

*Fear of recurrence.* Fear of recurrence is measured by the Concerns About Recurrence Scale (Vickberg, 2003), which is a 30-item Likert-type instrument that measures worry related to recurrence, what it is, and the extent of worry. Internal consistency is .87; higher scores indicate greater fear (Vickberg, 2003).

*Perceived stress.* Perceived stress is measured by the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983), which is a 14-item Likert-type instrument that assesses "how often in the past month one appraises life situations as stressful." Items are scored from 0 (*never*) to 4 (*very often*). Internal consistency is reported to range from .84 to .86; higher scores indicate more perceived stress.

*Anxiety.* Anxiety is measured by the State Trait Anxiety Inventory (Spielberger, Gorsuch, & Luschene, 1983), which contains two 20-item Likert-type scales that measure both state anxiety (Y1—present experience of anxiety) and trait anxiety (Y2—potential experience of anxiety symptoms when confronted with a threatening situation). Internal consistency is .95; higher scores indicate greater anxiety (Spielberger et al., 1983).

*Depression.* Depression is measured by the Center for Epidemiological Studies Depression (CES-D) scale, which is a 20-item measure of depressive symptomatology (Radloff, 1977). It measures the frequency of depressive symptoms during the previous week on a 4-point scale. Reliability  $\alpha$  is .92 for BC participants; higher scores indicate more depression.

*Optimism.* Optimism is measured by the Life Orientation Test–Revised (LOT-R; Scheier, Carver, & Bridges,

1994) scale, which contains six target items measured on a 5-point Likert-type scale, ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). Reliability  $\alpha$  ranges from .74 to .78; higher scores indicate greater optimism.

**Social support.** Social support is measured using the Medical Outcomes Social Support Survey (Sherbourne & Stewart, 1991), which is used by patients with chronic conditions and contains 19 items with four subscales of social support: Tangible, Affectionate, Positive Social Interactions, and Emotional or Informational. They are scored on a 5-point Likert-type scale. The internal consistency is reported as .97 and for the subscales .91 to .96; higher scores indicate greater social support.

**Spirituality.** Spirituality is measured by a two-item 10-point Likert-type scale, which is widely used in epidemiological research and addresses: (a) degree of strength and comfort derived from religion, responses ranging from 0 (*none*) to 3 (*a great deal*), and (b) the comfort derived from religion: 0 (*not at all*) to 10 (*very religious*). Internal consistency reported for these items has been identified as .62; higher scores indicate greater spirituality (Idler & Kasl, 1997; Zuckerman, Kasl, & Ostfeld, 1984).

**QOL and vitality.** These items are measured by the Medical Outcomes Studies Short-Form General Health Survey (MMOS 36), a 36-item health status instrument that uses Likert-type items (Ware, Kosinski, & Keller, 1994) and includes eight subscales that address the following: Physical Functioning, Physical Role Functioning, Bodily Pain, General Health, Vitality, Social Functioning, Emotional Role Functioning, and Mental Health. Subscale scores range from 0 to 100 with higher scores indicating a more favorable health status and QOL (i.e., better physical functioning, no problems with daily activities, no limitations because of pain, excellent personal health, high energy, normal social activity, no problems of emotional distress, and feeling peaceful, calm, and happy all the time). Estimates of internal consistency reliability range from .62 to .94, and the majority of scores have exceeded .80; higher scores indicate greater QOL (Ware et al., 1994).

**Symptoms.** Symptoms are measured using the Memorial Symptom Assessment Scale (MSAS), which contains 32 physical and psychological symptoms (Chang, Hwang, Feuerman, Kasimis, & Thaler, 2000), each of

which are evaluated by three categories that assess how often the patient had the symptom, how severe the symptom was, and how much distress the symptom caused. Cronbach's  $\alpha$ s range from .58 to .88 for MSAS subscales (Portenoy et al., 1997) and is reported as .87 for the total MSAS for a sample of cancer patients; higher scores indicate more symptoms.

## Statistical Analysis

Compliance with the MBSR(BC) program was described through descriptive statistics and was assessed by attendance at classes and minutes of practice. "Compliers" were defined as those who completed at least 75% of all classes. Minutes of practice by each participant were obtained weekly from the collected practice diary and totaled for total minutes of practice per type of meditation per person for each week.

To assess whether MBSR(BC) had a positive influence on psychological status, physical symptoms, and QOL, pretest to posttest differences were evaluated by use of paired *t* tests. Results were stratified by compliers and noncompliers in a secondary analysis between groups (independent group *t* tests) and total minutes of practice to investigate whether full compliance with the MBSR program resulted in greater improvements in psychological status, symptoms, and QOL. Given the relatively small sample size of 17 participants used in the final analysis (i.e., relatively low statistical power), a conventional *p* value of .05 was used to denote statistical significance, recognizing the potential for Type I error given the large number of comparisons made. In a post hoc analysis of statistical power based on the 17 participants with complete pretest and post-MBSR data and two-sided paired *t* tests (Type I error rate = .05), the study provided 80% power to detect a large effect size of .72.

## Results

### Baseline Characteristics of the Study Population

Fifty-eight women who met inclusion criteria were approached for potential participation in this study. Twenty-seven women declined, and 31 (53.4%) agreed to attend an orientation session. Some reasons for declining were the following: lived too far (15), schedule conflicts (i.e., a full-time job; 8), not

**Table 1.** Demographic and Clinical Characteristics of Study Population (N = 19)

	<i>n</i>	Mean ± SD or Percentage
Age (mean ± SD)	19	56.8 ± 8.8
Ethnicity		
White, not Hispanic	17	88.9
Black, not Hispanic	1	5.6
White, Hispanic	1	5.6
Marital status		
Married	16	84.2
Single	1	5.3
Divorced	2	10.5
Educational status		
Some high school	1	5.3
High school graduate	1	5.3
Some college or associates degree	7	36.8
College	7	36.8
Graduate or professional school	3	15.8
Employment status		
Employed >32 hours/week	8	42.1
Employed <32 hours/week	1	5.3
Homemaker	1	5.3
Unemployed	1	5.3
Retired	8	42.1
Cancer stage		
0	5	26.3
1	14	73.7
Treatment type		
Radiation	17	89.5
Radiation and chemotherapy	2	10.5

interested (6), family obligations (2), health issues (2), and transportation issues (4). Of those 31, 19 (61.3%) personally attended the orientation and consented to participate in the study; however, 17 of the 19 enrolled women (89.5%) ultimately completed the full study. Table 1 provides descriptive characteristics of the study population. As seen, the mean age was 57 ± 9 years; 94% were White, most (73.7%) had Stage I cancer, and only 2 participants (10.5%) had undergone chemotherapy.

### Compliance

Table 2 provides an overview of compliance with the MBSR(BC) program by class attendance. As seen, 67% of the study sample met the criteria for being a “complier” (at least six of eight classes attended). For MBSR practice outside of the formal classroom setting, the median time practiced per week for

**Table 2.** Number and Percentage (With 95% Confidence Interval) of Weekly Classes Attended by Study Participants (Out of a Total of Eight Classes)

Compliance (Classes Attended)	Number of Participants <sup>a</sup> (N = 18)	Percentage of Participants	Exact 95% Confidence Interval for Percentage
Three or more (37.5%)	18	100.0	81.5, 100.0
Four or more (50.0%)	16	88.9	65.3, 98.7
Five or more (62.5%)	14	77.8	52.4, 93.6
Six or more (75.0%)	12	66.7	41.0, 86.7
Seven or more (87.5%)	10	55.6	30.8, 78.5
All 8 classes (100.0%)	5	27.8	9.7, 53.5
Mean 6.3 (1.7), Range = 3-8			

a. One of the 19 participants did not have any compliance data; 1 participant participated in some classes but did not complete the program.

sitting meditation was 34 minutes; for walking meditation, 2; for body scan, 19; and for yoga, 0. Overall, across all 7 weeks of follow-up, a median total of 101 minutes were practiced per week outside of class. Thus, within this sample, weekly MBSR practice outside of the classroom varied highly across participants and was, more often than not, less than 2 hours per week. In Weeks 1 to 3, the median practice outside of the classroom was approximately 2 hours; however, by Week 4, only a minority of the patients (33%) reported practicing MBSR outside of class.

### Effects of MBSR on Psychological Status, Physical Symptoms, and QOL

Results on whether MBSR(BC) had a positive effect in relation to changes in psychological status (physical symptoms and QOL) are reported in Table 3. Significant improvements were reported for several psychological measures. Fear of recurrence of BC was significantly reduced ( $p = .01$ ) as were specific problems related to recurrence concerns ( $p = .04$ ). In addition, lower self-reported scores at the posttest assessment were reported for state anxiety ( $p = .09$ ), trait anxiety, ( $p = .01$ ), depression ( $p = .009$ ), and Perceived Stress Scale ( $p = .01$ ). Results also significantly improved in QOL, subcomponents of emotional well-being ( $p = .003$ ), and general health ( $p = .03$ ). When symptoms were

**Table 3.** Mean Instrument Scores Before and After Completion of MBSR(BC), *N* = 17

Measure	Score (mean $\pm$ SD)		Mean Difference (Before – After) and 95% CI for Difference	<i>p</i> Value
	Before MBSR	After MBSR		
Psychological status				
Concerns about recurrence				
Overall concerns about recurrence	11.8 (5.0)	9.1 (4.5)	2.7 (0.6, 4.8)	.01
Problems from recurrence concerns	30.8 (16.4)	23.6 (19.0)	7.2 (0.2, 13.6)	.04
Perceived Stress Scale	17.9 (8.1)	13.2 (4.4)	4.7 (1.1, 8.2)	.01
Life Orientation Test <sup>a</sup>	17.3 (3.3)	18.3 (3.4)	-1.0 (-1.2, 0.3)	.14
State Trait Anxiety Inventory				
State	36.5 (11.3)	31.9 (6.8)	4.6 (-0.9, 10.1)	.09
Trait	38.2 (10.7)	32.1 (5.2)	6.1 (1.6, 10.4)	.01
Center for Epidemiologic Studies Depression Scale	9.7 (8.0)	5.0 (3.4)	4.7 (1.4, 8.1)	.009
Medical Outcomes Social Support <sup>a</sup>				
Emotional/informational support	32.1 (6.3)	34.1 (5.7)	-2.0 (-5.2, 1.2)	.21
Tangible support	16.5 (3.5)	17.4 (2.3)	-0.9 (-2.3, 0.3)	.13
Affectionate support	13.1 (2.6)	14.1 (1.4)	-1.0 (-2.5, 0.5)	.20
Positive social interaction	12.8 (2.9)	13.1 (2.1)	-0.3 (-1.3, 0.6)	.46
Rating of Spirituality	6.4 (2.4)	6.9 (2.0)	-0.5 (-1.3, 0.3)	.18
Physical symptoms				
Brief Pain Inventory				
Pain severity	1.6 (1.3)	1.5 (1.2)	0.1 (-0.3, 0.5)	.59
Pain interference	1.1 (1.4)	0.9 (0.9)	0.2 (-0.4, 0.9)	.43
Quality of life				
SF-36 Health Survey <sup>a</sup>				
Physical functioning	84.4 (18.4)	87.6 (14.5)	-3.2 (-8.3, 1.8)	.19
Role limitations—physical health	67.6 (39.3)	83.8 (30.5)	-16.2 (-37.5, 5.1)	.13
Role limitations—emotional problems	82.4 (29.1)	86.3 (26.5)	-3.9 (-25.7, 17.8)	.71
Energy/fatigue	55.6 (28.2)	65.0 (19.3)	-9.4 (-21.8, 3.0)	.13
Emotional well-being	76.0 (15.7)	85.9 (6.7)	-9.9 (-15.8, -4.0)	.003
Social functioning	90.4 (13.6)	93.4 (13.3)	-3.0 (-12.2, 6.3)	.51
Pain	80.4 (18.6)	80.9 (18.8)	-0.5 (-7.2, 6.3)	.89
General health	70.3 (19.7)	77.4 (15.8)	-7.1 (-13.5, -0.6)	.03

Note: MBSR(BC) = mindfulness-based stress reduction (breast cancer); CI = confidence interval.

a. Higher scores after MBSR(BC) represent improved optimism, social support, and health. Results only presented on participants completing MBSR.

assessed from pretest to posttest on the MSAS (see Table 4), there were significant decreases in the frequency, severity, and distress of symptoms on all symptom subscales. These included the Global Distress Index, Physical Symptom Subscale, Psychological Symptom Subscale, and total MSAS.

## Discussion

This study is unique in that it is the second to assess MBSR among women with BC who have recently transitioned from completion of treatment to survivorship. Results from this investigation indicate that the MBSR(BC) program is feasible to deliver in the clinical setting. Fifty-three percent of those

approached to participate in the study were willing to attend an orientation session, indicating that a large percentage of survivors are receptive to stress-reducing interventions. Ultimately, nearly two thirds of those who initially agreed to participate actually attended the orientation and formally consented to participate in the MBSR(BC) classes. This is similar to a recently conducted RCT using a modified 6-week MBSR(BC) program where, out of 200 patients approached, 84 (42%) consented to participate following an orientation session, and nearly all consenting participants completed the program (Lengacher et al., 2009). These data reinforce the overall perceived desire among women who have recently completed treatment for BC to participate in stress-reducing interventions.

**Table 4.** Mean Memorial Symptom Assessment Scores Before and After Completion of MBSR(BC), N = 17

Scale/Subscale	Score (mean ± SD)		Mean Difference (Before – After) and 95% CI for Difference	p Value
	Before MBSR	After MBSR		
<b>Global Distress Index</b>				
Frequency of symptoms	1.1 (0.9)	0.4 (0.7)	0.7 (0.3, 1.1)	.003
Distress of symptoms	0.6 (0.5)	0.3 (0.3)	0.3 (0.03, 0.5)	.03
Total subscale score	0.9 (0.6)	0.4 (0.4)	0.5 (0.2, 0.8)	.001
<b>Physical Symptom Subscale</b>				
Frequency of symptoms	0.9 (0.6)	0.6 (0.5)	0.3 (0.07, 0.5)	.01
Severity of symptoms	0.5 (0.3)	0.3 (0.3)	0.2 (0.05, 0.3)	.008
Distress of symptoms	0.4 (0.3)	0.2 (0.2)	0.2 (0.02, 0.3)	.03
Total subscale score	0.6 (0.4)	0.4 (0.4)	0.2 (0.06, 0.4)	.01
<b>Psychological Symptom Subscale</b>				
Frequency of symptoms	1.3 (0.8)	0.7 (0.6)	0.6 (0.3, 0.9)	.002
Severity of symptoms	1.1 (0.7)	0.6 (0.4)	0.5 (0.2, 1.0)	.005
Distress of symptoms	1.0 (0.9)	0.4 (0.4)	0.6 (0.2, 1.1)	.006
Total subscale score	1.2 (0.8)	0.6 (0.4)	0.6 (0.2, 1.0)	.003
<b>Total Memorial Symptom Assessment Scale</b>				
Frequency of symptoms	0.9 (0.5)	0.6 (0.4)	0.3 (0.2, 0.5)	.0003
Severity of symptoms	0.6 (0.3)	0.3 (0.2)	0.3 (0.2, 0.4)	.0001
Distress of symptoms	0.5 (0.4)	0.3 (0.2)	0.2 (0.1, 0.4)	.0007
Total score	0.7 (0.4)	0.4 (0.2)	0.3 (0.2, 0.5)	.0002

Note: MBSR(BC) = mindfulness-based stress reduction (breast cancer); CI = confidence interval. Results only presented on those participants completing MBSR.

In addition, our study indicates that among women in transition from Stage 0 or I BC treatment, the majority (i.e., 17 of 19, 89.5%) who enroll in an MBSR(BC) program are able and willing to ultimately complete the program. Similarly, using our metric of compliance ( $\geq 6$  of 8 classes attended), our compliance rate of 67% is comparable to the compliance rate of 78% ( $\geq 7$  of 9 sessions) for a similar study of cancer patients (Carlson, Specia, Patel, & Goodey, 2004) as well as compliance data reported previously with 80% of participants attending 5 out of 7 sessions (Shapiro, Bootzin, Figueredo, Lopez, & Schwartz, 2003). In our study, a frequent reason for nonattendance was a follow-up medical appointment that could not be changed as opposed to a lack of commitment or enthusiasm for the MBSR(BC) program itself. On the other hand, despite overall good attendance at the formal MBSR(BC) sessions and completion of the program at large, individual, independent practice of the components of MBSR outside of the group classroom setting was highly variable and tended to wane over time, especially at the midpoint of 3 to 4 weeks. These data suggest that strong emphasis on the need for MBSR practice (outside of class) at the start of the MBSR(BC) program as well as interim reinforcement are likely to be necessary for full compliance among BC patients

who have recently transitioned from treatment completion to survivorship.

In addition to demonstrating feasibility, a *second major* contribution of this study was consistent evidence that significant reductions in psychological status and physical symptoms and improvements in QOL appear to be achievable with the use of MBSR(BC). Of note, fear of recurrence, trait anxiety, depression, and perceived stress significantly improved among study participants following the intervention, and two subcomponents (i.e., emotional well-being and general health) of QOL improved as well. These results are consistent with other MBSR clinical studies, including one among cancer outpatients that found significant reductions in mood disturbance and fewer symptoms of stress at 6-month follow-up (Carlson et al., 2001; Specia et al., 2000). In another nonrandomized clinical study among BC patients, those assigned to MBSR showed improvements in QOL and coping effectiveness (Witek-Janusek et al., 2008). Furthermore, another study among a mixed cancer population of breast and prostate cancer patients found significant improvements in overall QOL and symptoms of stress and sleep quality (Carlson, Specia, Patel, & Goodey, 2003; Carlson & Garland, 2005). In a larger RCT among Stage II BC patients who experienced high

levels of cancer anxiety, MBSR was associated with significant improvements in sleep quality measures. The relationship between mindfulness and improved sleep quality was most evident for patients with significant distress (Shapiro et al., 2003). On balance, these studies provide consistent evidence of positive effects of MBSR among cancer patients, with our study extending findings to women who have transitioned from completion of BC treatment to resuming normal daily life activities. To our knowledge, only one other study has been published that has used the MBSR program among a group of BC survivors transitioning off of treatment, and results of this RCT have been similar to those observed in our study (Lengacher et al., 2009).

Although limited by sample size, we did not find evidence of a “dose” effect, whereby attendance in at least six of the eight MBSR(BC) classes (compliance) substantially improved patient outcomes compared with less frequent attendance. Our finding of no significant “dose” effect may have been because of our limited sample size. Our results are in contrast to another RCT that showed that participants who attend more classes may attain greater benefits of the program (Carlson et al., 2001; Speca et al., 2000). In our own recently conducted RCT, compliers with the MBSR program had better QOL scores for bodily pain, energy, and physical functioning, whereas psychological status was significantly improved in the MBSR(BC) group irrespective of compliance status (Lengacher et al., 2009). These findings also suggest that a study with a control could be done; therefore, a larger study with a control group was initiated. Furthermore, the addition of a control group would be useful to determine if effects of the MBSR intervention from pretest to posttest are truly a result of the intervention itself or are just an improvement as a result of increasing time since completion of treatment. In our recently conducted RCT of 84 BC survivors, those randomized to the MBSR(BC) group showed significantly more improvement in psychological symptom and physical symptoms when compared with controls (Lengacher et al., 2009).

A *third important outcome* of our study was the finding of significant improvements in patient fear of recurrence of cancer after the MBSR(BC) intervention. This is similar to findings in our recently conducted RCT (Lengacher et al., 2009). In our study, fear of recurrence was measured in two related

ways: overall concerns about fear of recurrence and problems (e.g., worries) that stem from the fear of cancer recurrence (e.g., health, womanhood, role, and death worries). Therefore, future studies may seek to evaluate how reductions in fear of recurrence may mediate some of the positive effects of MBSR among cancer patients.

### Limitations

Study limitations included small sample size, lack of a control group, and lack of any kind of extended follow-up evaluation for participants. The lack of any finding of a dose effect regarding compliance versus the positive effects of MBSR is suggestive that increasing time from cancer diagnosis and treatment could play a role in psychological and physical symptom improvement. In addition, multiple comparisons were made and could be adjusted accordingly. Finally, our findings are directly applicable only to the present study population which included Stage 0 and Stage I BC patients, treatment primarily with radiation alone (no chemotherapy) and mostly White race with relatively high educational attainment. Extrapolation of these findings to other patient groups will require assessment in other study populations.

### Implications for Practice and Research

This study is the second to indicate a significant clinical benefit of MBSR(BC) among women with BC who are in transition from treatment to survivorship. This study shows further evidence of the benefits that complementary and alternative medicine interventions may have in nursing practice. Implementation of this intervention in nursing may help decrease patient symptoms following cancer treatment while improving psychological status and QOL. Moreover, the MBSR(BC) intervention appears well suited (i.e., feasible) to be implemented by nurses in a safe and effective manner during the particularly stressful time when cancer patients have formally completed treatment and are seeking to resume normal daily activities and lifestyle. MBSR(BC) training needs to be provided by a trained MBSR professional, and nurses who are trained in this stress reduction program could assist survivors as they transition off treatment to survivorship.

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