The prevalence and correlates of mind-body therapy practices in patients with acute coronary syndrome

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Summary
Objectives: While the benefits of mind-body therapy (MBT) for cardiac secondary prevention continues to be investigated, the prevalence of such practices by cardiac patients is not well known. The aim of this study was to quantitatively examine the prevalence of MBT practice and its sociodemographic, clinical, psychosocial and behavioral correlates among patients with acute coronary syndrome (ACS).
Methods: Six hundred and sixty-one ACS in-patients (75% response rate) recruited from three hospitals completed a demographic survey, and clinical data were extracted from charts. Four hundred and sixty five patients (81% retention rate; 110 (23.7%) female) responded to an 18-month post-discharge survey that queried about MBT use and its correlates.
Results: One hundred and sixty-three (35.1%) ACS patients practised MBT in their lifetime, and 118 (25.4%) were currently practising. MBT users were more often women (OR = 2.98), non-white (OR = 2.17), had higher levels of education (OR = 2.22), past smokers (OR = 3.33), reported poorer mental health (OR = 2.15), and engaged in more exercise (OR = 1.65).
Conclusion: One-third of ACS patients practised some form of MBT. The greater MBT practice among female ACS patients is noteworthy, given their generally lower physical activity and lower receipt of evidence-based treatments including cardiac rehabilitation. In addition, there is some evidence that MBT can promote mental well-being, and thus such practice might reduce risk related to negative affect in cardiac patients.

Introduction

Mind-body therapies (MBTs) are defined as ''techniques designed to enhance the mind's capacity to affect bodily functions and symptoms''.[1] There are two main categories: relaxation techniques including meditation and deep breathing, and somatic techniques which incorporate exercise with relaxation such as yoga and Tai Chi.[2] Numerous

MBTs such as deep breathing, yoga and Tai Chi may ease the burden of cardiovascular diseases (CVD).[3,4] MBT practice may have favourable effects for both traditional CV risk factors such as physical inactivity[5] and for emerging risk factors such as stress,[6] anxiety and depression.[7] Preliminary evidence suggest that decreased sympathetic arousal,[8,9] which in turns improves physiologic CVD risk factors such as atherosclerosis, hypertension, hyperlipidemia, hyperglycemia, and hyperinsulinmia may be the possible mechanism.[10,11] Although there is insufficient evidence to promote MBT practice for cardiac patients, they may choose to use alternative forms of therapy to deal with their condition.[12,13]

While much research has begun to investigate the use of CAM products such as dietary and herbal supplements among cardiac patients,[14–18] relatively few studies have investigated the prevalence of MBT practice among cardiac patients, explored which patients tend to be more likely to practice MBT, and the psychosocial and behavioral correlates related to such practice. Recent studies have examined the general use of CAM, including MBT, non-prescribed exercise, chiropractic, megavitamins, nutrition and herbals and other non-conventional medical therapies in a cardiac sample. The first study[6] of 263 preoperative or postoperative cardiac patients self-reported 11.4% using meditation, 2.3% yoga, and 1.5% Tai Chi.[19] The second study[7] sampled 246 acute coronary bypass (ACB) patients,[12] and over 66% of participants reported using CAM broadly, with 26.2% used in relaxation techniques, 11.6% imagery and 2.2% biofeedback. The third study[20] interviewed 107 cardiac surgical patients; 8% of participants reported using relaxation and 8% biofeedback. The fourth study[21] sampled 223 patients with acute coronary syndrome (ACS). In this patient population 63% of participants reported using at least one CAM therapy for general health reasons, with 33.2% using prayer. The latest findings suggest that 36% of the cardiac patients used CAM, among which 17% used MBT such as meditation, yoga, Tai Chi, and others[13].

Correlates of MBT use have been infrequently examined in cardiac samples, but those identified in cardiac and non-cardiac studies include female gender,[22–24] middle age,[22,23] higher levels of education,[22–26], higher income,[25,26] higher functional status,[25] perceived poorer health,[26,27] more non-cardiac comorbidities,[25,28] more anxiety and depression,[25,28,29] and more exercise behavior.[30,31]

The current study examined the prevalence of MBT practice among cardiac patients with regard to frequency and duration, as well as its sociodemographic, clinical, psychosocial and behavioral correlates.

Methods

Participants

Of 1336 consecutive in-patients with ACS approached at the University Health Network Toronto General and Western Hospitals and Trillium Health Centre in Ontario, Canada, 661 were eligible and consented to participate (75% response rate). Inclusion criteria were (a) diagnosis of a confirmed myocardial infarction (MI) or unstable angina (UA) based on medical chart reviews, and (b) patients waiting in hospital for percutaneous coronary interventions (PCI) or ACB procedures. Exclusion criteria were medical instability, ineligibility for or previous participation in cardiac rehabilitation (CR)[32] (based on requirements for a larger study), lack of English language proficiency, or being under the age of 18. Characteristics of participating, declining and ineligible patients are shown in Table 1. The baseline sample of participants was more often male and younger than non-participants.

Design and procedure

The larger study was designed to examine access to CR and received ethics approval from participating institutions. The study design was prospective and observational. At time of recruitment, participating patients completed a self-report sociodemographic questionnaire, and clinical data were extracted from medical charts. Eighteen months post-discharge, a survey was mailed to the 661 participants, which included an assessment of MBT practice, and psychosocial and behavioral correlates. To optimize response, repeated mailings of the survey were sent, forwarded with a personalized cover letter, based on Dillman's method.[33]

Measures

MBT practice was assessed in the 18-month post-discharge survey using forced-choice options. Participants were queried as to type of MBT, including meditation, yoga, Qigong, Tai Chi, relaxation techniques, deep breathing exercise, visualization, guided imagery, quiet sitting, mantra, muscle relaxation, and others (please specify); onset of practice (pre- or post-ACS diagnosis); and duration and frequency of practice. Correlates of MBT practice were assessed as outlined below.

Table 1 Self-reported characteristics of participants, declining, and ineligible patients at baseline recruitment, $N = 1363$

Characteristic	Participants ($n = 661$)	Decliners ($n = 218$)	Ineligibles ($n = 483$)
Condition/procedure (%PCI)	405 (61.3%)	109 (50.2%)	184 (38.3%)*
Sex (% female)	157 (23.8%)	77 (35.6%)	186 (38.6%)*
Marital status (% married)	503 (76.1%)	160 (76.2%)	339 (71.5%)
Age (mean ± S.D.)	61.22 ± 11.30	65.96 ± 11.96*	66.48 ± 11.39*

PCI, percutaneous coronary intervention.
* $p < .001$.

Sociodemographic correlates

Sociodemographic data were collected when participants were recruited as in-patients. These data included age, sex, ethnocultural background (www.statcan.ca), marital status, level of education, and gross annual family income.

Clinical correlates

Index ACS condition or procedure, weight and height, and smoking status (current, past or non-smoker) were assessed via chart-report and self-report at baseline, respectively. Medical data such as non-cardiac comorbidities were collected in the 18-month post-discharge survey. Participants were given a list of comorbid conditions including cancer, allergies, breathing problems, mental or emotional, or other problems that could be selected by checking a 'Yes/No' option. The categories selected as 'Yes' were summed to obtain a total comorbidity score.

The functional status of participants was assessed by the Duke activity status index (DASI)[34] was used to assess the severity of disease. This 12-item instrument measures activities of daily life such as household tasks, ambulation, personal care, sexual function, and recreational activities. Possible scores range between 0 (worse) and 58.2 (best), where higher scores represent better physical functioning. Validation of the DASI has been demonstrated by its correlation with peak oxygen uptake ($r = 0.58$[35]).

Psychosocial and behavioral correlates

Anxiety and depressive symptoms were assessed using the hospital anxiety and depression scale (HADS), which has shown good reliability and validity in cardiac samples.[36] Seven items measure anxiety and seven items measure depressive symptoms, with four response options (0—3), ordered in terms of frequency or severity. Two subscales were generated, and higher scores indicate higher levels of anxiety or depressive symptoms.[36] The Cronbach's α coefficient has been reported to be 0.83 for the anxiety subscale, and 0.82 for the depression subscale.[37] The sensitivity and specificity for both the anxiety and depression subscales is 0.80.[37]

The revised illness perception questionnaire (IPQ-R)[38] was used to assess patients' cognitive representations of their cardiac condition. The subscales of timeline, cyclical episodic, consequences, and cure/control were incorporated, and were measured using four to six items each on a five-point Likert scale. Higher scores on the IPQ-R subscales indicate a belief that the illness will last a long time, that symptoms such as chest pain are recurrent and random, greater perceived consequences of illness, and an inability to control or cure the illness. These beliefs are indicative of a negative perception of the illness. Cronbach's alpha coefficients for each of the subscales ranged from 0.79 for the timeline cyclical subscale to 0.89 for the timeline acute/chronic subscale.[38]

The exercise behavior subscale of the health-promoting lifestyle profile II (HPLPII)[39] was used to assess the amount of recreational and physical activity participants engaged in. The subscale consists of seven items rated on a 4-point Likert scale from 'never' to 'routinely'. A mean score was computed, with possible scores ranging from 1 to 4 and higher scores indicating greater exercise participation. During its development, the HPLPII showed high internal consistency, with a Cronbach's alpha coefficient of 0.92.[39]

The exercise benefits and barriers scale (EBBS)[40] was used to assess perceived physical activity benefits and barriers. The EBBS is a 43-item measure, where items are rated on a 4-point Likert scale. The benefits subscale is comprised of 29 items and measures an individual's perception about positive aspects of routine exercise. The barriers subscale consists of 14 items and assesses a person's belief about negative aspects of exercise. Higher scores on both subscales indicate more perceived benefits or more perceived barriers, whereas a higher benefits-to-barriers difference score indicates more perceived benefits and fewer barriers. The standardized Cronbach's alpha coefficients were 0.95 for the total scale, 0.95 for the benefits scale, and 0.89 for the barriers scale.[40]

Analyses

All analyses were performed using SPSS version 14.0. The retention rate was computed, and differences between retained and non-retained participants were assessed using Chi-square and *t*-tests as appropriate.

Data were cleaned and screened. First, descriptive examination of MBT practice variables was performed. Second, bivariate analysis was done to assess the relationship between practice of MBTs and those who did not. Finally, a multivariate logistic regression model examining the (18-month post-discharge) and sociodemographic, clinical, and psychosocial factors. A multivariate logistic regression model was performed with the dependent variable being current use of MBTs and the independent variables all those significant ($p < 0.05$) at the bivariate screening. Spearman *R* correlation test was used to assess all the hypothesized correlates to check for multicollinearity. All variables were entered simultaneously. Odds ratios and 95% confidence Intervals were reported.

Results

At 18-month post-discharge, 465 participants were retained in the study (81.3% retention rate). A total of 90 patients were ineligible whereas 106 patients declined. Reasons for ineligibility were as follows: could not reach/incorrect contact information ($n = 57$; 63.3%), too ill to take part ($n = 13$; 14.4%), deceased ($n = 10$; 11.1%), previous participation in CR ($n = 3$; 3.3%), and other reasons ($n = 9$; 10%). Retained participants tended to be older, Caucasian, married/common law, have a higher family income, non-smoker, less likely to be diabetic, and have undergone a PCI procedure (Table 2). Participants' ages ranged from 33 to 91. The most frequently reported non-white

Table 2 Characteristics of participating, declining and ineligible patients at 18-month follow-up assessment $N = 661$

Characteristic	Participants ($n = 465$)	Declined ($n = 106$)	Ineligible ($n = 90$)
Condition/procedure[a] (%PCI)	290 (62.4)	69 (65.1)	43 (47.8)**
Sex (% female)	110 (23.7)	28 (26.4)	19 (21.1)
Marital status (% married or common law)	369 (79.4)	74 (69.8)*	58 (64.4)**
Age (mean ± S.D.)	62.70 ± 10.60	57.06 ± 10.92***	58.47 ± 13.54**
Body mass index (mean ± S.D.)	28.32 ± 4.77	29.55 ± 5.72*	28.77 ± 5.51
Activity status (mean ± S.D.)	34.60 ± 17.35	32.59 ± 16.97	31.59 ± 17.83
NYHA[a] (% class 1)	390 (88.8)	89 (87.3)	75 (91.5)
Diabetes (% yes)	96 (20.8)	35 (33)*	23 (26.1)
Arthritis (% yes)	111 (23.9)	21 (19.8)	22 (25.6)
Smoker (% current)	62 (13.5)	29 (27.9)*	23 (26.1)
Ethnocultural background (% white)	374 (85.0)	70 (71.4)**	63 (76.8)
Education (% some post-graduate or greater)	238 (52.2)	53 (50.5)	48 (53.9)
Family income (% ≥$50 000CAD)	227 (59.4)	40 (47.1)*	30 (38.5)***

PCI, percutaneous coronary intervention; NYHA, New York Heart Association.
[a] Extracted from medical charts.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

ethnocultural backgrounds were South Asian, Black, and Filipino.

Prevalence of MBT practice

Of the 465 participants, 163 (35.1%) self-reported practising at least one form of MBT in their lifetime. Of the 163 participants, 118 (25.4%) reported participating in such activities at 18-month post-discharge and thus were considered for further analyses. Table 3 presents the types of MBT practised. Other types of MBT included prayer, guided imagery, music, mantra, relaxation therapy, and self-hypnosis. Participants most frequently reported practice of one form of MBT ($n = 41$; 34.7%), the rest practised more than one type of MBT; the median of the number of MBT practised was 2.

Eighty-one participants (68.6%) started practising MBT before their ACS diagnosis. Ninety-five participants (80.5%) had been practising MBT for more than 1 year. MBT was most frequently practised once a day ($n = 55$; 46.6%), followed by once a week ($n = 45$; 40.7%), and less than once a week ($n = 15$, 12.7%). The duration of MBT sessions was most frequently less than 1 h ($n = 102$; 86.4%).

Table 3 The self-reported prevalence of mind-body therapy practice post-ACS diagnosis? ($N = 415$)

Type of MBT	*n*	%
Deep breathing	56	13.5
Meditation	50	12.0
Quiet sitting	38	9.2
Yoga	35	8.4
Muscle relaxation	28	6.7
Tai Chi	20	4.8
Visualization	14	3.4
Other	25	6.0

Correlates of MBT practice

Table 4 illustrates the mean and standard deviation or frequency and percentage of potential correlates by MBT use. *t*-Tests and chi-square respectively were used to test for significant differences among participants reporting MBT practice versus those not practising MBT. As shown in Table 4, these bivariate analyses revealed that current MBT practice was significantly related to sociodemographic correlates such as being female, non-white, a non-smoker, and more educated. MBT practice was also significantly related to clinical correlates such as lower body mass index (BMI), having comorbidities such as mental/emotional problems. Finally, MBT practice was also significantly related to psychosocial and behavioral correlates such as engaging in more exercise, higher perceived exercise benefits, fewer exercise barriers and a higher exercise benefits-to-barriers ratio. The variable exercise benefits-to-barriers ratio was left out from the logistic regression model to minimize multicollinearity because the two benefit and barrier subscales are the derivations of it.

These significant variables were entered into the logistic regression model. As shown in Table 5, this analysis revealed that being female, being non-white, more educated, a past smoker, engaging in more exercise, and reporting comorbid emotional problems were significantly related to MBT practice ($\chi^2 = 46.36$, $p \leq 0.000$).

Discussion

Despite the lack of rigorous research and evidence demonstrating the efficacy of MBT in the secondary prevention of CVD,[41,42] 35% of cardiac patients reported practising some form of MBT in their lifetime, while 25% of them reported continued or began their MBT practice since their ACS diagnosis. Deep breathing and meditation were the most frequently practised techniques; these represent relaxation rather than somatic forms of MBT.

Table 4 Hypothesized correlates by use of mind-body therapies

Correlate	Mean (S.D.)/*n* (%)			
	MBT *n* = 118	Non-MBT *n* = 297	*t*-test/χ^2	Sig.
Sociodemographic[a]				
Age	62.8 (10.5)	62.3 (10.7)	0.52	
Gender				
Female	35 (29.7)	55 (18.5)	6.17	*
Education level				
Some post graduate+	79 (68.1)	134 (46.0)	16.17	***
Family gross income				
High: over 50 k/year	59 (60.2)	146 (60.3)	0	
Ethnic background				
Non-white	23.0 (21.7)	38.0 (13.3)	4.11	*
Clinical[a]				
Body mass index	27.4 (4.1)	28.7 (4.9)	−2.19	*
Smoker				
Current	8 (6.9)	48 (16.3)	7.86	*
Past	61 (52.6)	156 (53.1)		
Non	47 (40.5)	90 (30.6)		
Comorbidities				
Muscle, bone, or joint problems	76 (65.0)	165 (55.9)	2.81	
Allergies	42 (35.9)	91 (30.8)	0.98	
Breathing problems	25 (21.6)	70 (23.9)	0.26	
High blood pressure	52 (44.4)	132 (45.4)	0.03	
Digestive system problems	34 (29.1)	69 (23.4)	1.44	
Diabetes	23 (20.5)	71 (24.1)	0.6	
Kidney, bladder, or urinary problems	23 (19.7)	63 (21.5)	0.17	
Neurological problems	9 (7.8)	19 (6.5)	0.23	
Headaches	22 (18.8)	43 (14.6)	1.1	
Mental or emotional problems	28 (23.9)	36 (12.2)	8.7	**
Cancer	6 (5.1)	15 (5.1)	0	
Gynecological problems	4 (3.5)	3 (1.1)	2.83	
Blood problems	5 (4.3)	11 (3.8)	0.06	
Total number of comorbidities	3.1 (2.2)	2.8 (2.0)	1.71	
DASI: functional status	42.9 (14.9)	41.3 (15.3)	0.97	
Behavioral and psychosocial[a]				
HADS: anxiety symptoms	5.7 (4.1)	5.2 (4.0)	1.1	
HADS: depressive symptoms	3.9 (3.5)	3.8 (3.6)	0.16	
HPLP: exercise behavior	2.5 (0.8)	2.2 (0.7)	4.14	***
EBBS: exercise benefits mean of total	3.1 (0.4)	3.0 (0.4)	2.39	*
EBBS: exercise benefits sum	130 (18.8)	124.2 (24)	2.33	*
EBBS: exercise barrier subscale	1.9 (0.4)	2.0 (0.4)	−2.7	**
IPQ: timeline (acute or chronic)	21.3 (5.6)	22.2 (5.3)	−1.46	
IPQ: cyclical or episodic	9.4 (3.3)	9.3 (3.4)	0.17	
IPQ: CVD consequences	17.6 (4.3)	18.4 (4.9)	−1.59	
IPQ: personal control over diseases	24.4 (3.3)	23.9 (3.5)	1.4	
IPQ: summary (cure or controllability)	18.8 (2.7)	18.3 (3.1)	1.66	

DASI: Duke activity status index; HADS: hospital anxiety and depression scale; HPLP: health promoting lifestyle profile; EBBS, exercise benefits and barriers scale; IPQ, illness perception questionnaire; MBT, mind body therapy.

[a] Type of correlate.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Table 5 Significant predictors in the multiple logistic regression ($n = 415$)

Variables	Odds ratio (95% CI)
Body mass index (>25, overweight)	0.98 (0.55–1.73)
Gender (female)	2.98 (1.53–5.77)***
Education level (some post graduate+)	2.22 (1.30–3.78)**
Ethnocultural Background (non-white)	2.17 (1.08–4.36)*
Smoking	
Current	1.00
Past	3.33 (1.28–8.70)*
Never	2.20 (0.81–5.93)
Mental or emotional problems	2.15 (1.10–4.19)*
HPLP: exercise behavior	1.65 (1.09–2.49)*
EBBS: exercise benefit subscale	1.01 (0.99 1.03)
EBBS: exercise barrier subscale	0.87 (0.38–2.01)

CI: confident interval; HPLP: health promoting lifestyle profile; EBBS: exercise benefits and barriers scale.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Yeh [13] conducted a post hoc analysis of CAM use including herbal products and MBTs in the 2002 U.S National Health Interview Survey. Among 31,044 respondents, 10,572 (33.9%) had CVD. The current non-epidemiological Canadian study focused on ACS patients exclusively, which excluded patients with hypertension, vascular insufficiency, stroke and other heart conditions included in Yeh's study. Both studies adopted a similar definition of MBT, except Yeh's study included biofeedback and energy healing with less than 1% of prevalence, which were not reported by participants in the current study. The demographic characteristics of the cardiac population studied were similar to the current study in terms of age, work status and self-reported health status. Despite these methodological differences, our results generally corroborate those of Yeh and Philips. They reported that 36% of respondents with CVD had used CAM in the previous 12 months, with 18% using herbal products and 17% practising MBT. This was somewhat lower than our findings of 25.4% MBT practice. Our study replicates their findings that deep breathing and meditation were the most commonly used form of MBT among CVD patients. Moreover, Yeh suggested that respondents used MBT for anxiety, depression, stress or emotional health and wellness. We also found that MBT users were more likely to report emotional or mental health problems. Correlates of MBT use found by Yeh were younger age, being female, having completed high school at least, greater annual household income, having a native or Asian ethnocultural background, self-reporting fair or poor health, having health insurance, and using other forms of CAM. Our findings replicate the correlates of female gender, higher education and non-white ethnic background, but did not replicate the correlates of younger age and higher income. Both studies found work status was not a significant correlate of MBT use.

Other previous cardiac studies in the U.S. include Ai and Bolling [12] who similarly found 26.2% of cardiac surgical patients had engaged in relaxation techniques. Liu et al. [19] reported 11.4% of ACB participants using meditation, 2.3% using yoga and 1.5% using Tai Chi, whereas in patients with ACS we found rates of 12, 8.4 and 4.8%, respectively. While our study reveals similar levels of meditation use, we report significantly greater use of the somatic forms of MBT.

Correlates related to MBT practice in the Ai and Bolling study included education, functional status, number of non-cardiac chronic conditions, status as a past cigarette smoker, and congestive heart failure. Our findings replicate the correlates of higher education and smoking status. Our findings also replicate the correlate of female gender, as reported by Barraco et al.[21] who found that women with ACS were more likely than men to use prayer and meditation. Both Liu et al. and Wood et al. [19,20] reported no relationship between the use of CAM and any sociodemographic or clinical (e.g., quality of life) correlates. Sociodemographic correlates in our study (such as female gender and higher education) are consistent with previous studies of healthy and non-cardiac patient populations.[22–26,31] However, correlates such as middle-age, higher family income, higher functional status, perceived poorer health, more non-cardiac comorbidities, which are reported in previous research, were not significant in our study.

The greater MBT practice among females and those of a non-white ethnocultural background is noteworthy, given that these cardiac patients are generally less physically active[43,44] and have lower participation in CR programs.[45–47] Increasing the participation of these cardiac patients in physical activity or CR programs is crucial to improve their prognosis, lower their mortality rate, and enhance their overall quality of life.[48] Promoting MBT practice through more somatic forms such as yoga and Tai Chi, where there is more evidence of potential cardiac risk reduction[49] may be warranted; however, more evidence of their effectiveness in this regard is needed.

The greater prevalence of MBT practice among female cardiac patients also implies that introducing MBT within conventional CR may attract this under-represented group to participate. Recent studies report that female cardiac patients desire CR programs with peer group support, more socialization opportunities, varied forms of exercise other than cycling or treadmill walking, and stress management programs.[50,51] MBT such as yoga and Tai Chi could be introduced to CR programs to increase social interactions and provide a greater variety of exercise options. Deep breathing and meditation were the most commonly practised forms of MBT in our study, and offering such programming may also enhance CR variety and serve as a stress management tool. Moreover, female cardiac patients often have lower aerobic capacity,[52] and prefer not to experience pain or fatigue due to exercise.[53] Unconventional forms of physical activity such as Tai Chi which is shown to be an additional form of aerobic exercise [43] and has low cardio-respiratory requirements[54] and may satisfy these preferences.

Regarding the finding of more comorbid mental and emotional problems such as depression, anxiety, or substance abuse among MBT users, previous research has corroborated that individuals using MBTs tend to be prone to anxiety.[27] For instance, the most commonly stated reason for MBT use among cancer patients was to alleviate anxiety, depression, and insomnia.[31] However, the present study did not

demonstrate a significant association between anxiety or depressive symptoms and MBT practice, thus the association with mental or emotional problems may imply that the patients who experienced depressive and anxiety symptoms engaged in MBT to reduce this negative affect. While MBT have been shown to alleviate anxiety and depressive symptoms among cardiac patients,[42] this potential therapeutic effect deserves further investigation. Nevertheless, the association between comorbid mental health problems and MBT use is noteworthy, given recent research suggesting that depression and anxiety can increase mortality in cardiac patients by two times.[55]

Greater exercise behavior was significantly associated with MBT practice. This is consistent with previous research which has shown that users of CAM, including MBT, tended to use exercise to alleviate their health problems.[30,31] These results suggest that the practice of MBT does not detract from time spent in more traditional forms of activity. In fact, these results suggest that MBT users perceive physical activity to be a priority for their health. This is encouraging, given low rates of activity in cardiac patients, and the cardiovascular benefits of exercise.

The main limitation of the current study relates to the use of self-report which introduces the potential of a social desirability bias. Furthermore, the generalizability of the results is limited, as there were some differences in characteristics of study participants and non-participants. Finally, given the nature of our study design, no causal conclusions can be drawn.

Conclusion

The prevalent practice of relaxation forms of MBT among patients with ACS deserves more research attention. Women and patients of diverse ethnocultural backgrounds are less likely to access and adhere to CR programs,[45–47] but were more likely to practice MBT. Incorporating MBT into CR programs as a complementary physical activity or a component of stress management may attract more patients to participate, and may address the greater emotional distress and lower physical activity among these groups. Given that low levels of physical activity and high rates of emotional distress negatively affect ACS prognosis,[56] use of MBT should be explored as a means to address this excess risk. Future research is needed to examine the therapeutic use and efficacy of MBT as a component in CR.

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References

1. National Center for Complementary and Alternative Medicine. Backgrounder. Mind-body medicine: An overview. Available at: http://nccam.nih.gov/health/backgrounds/mindbody.htm. Accessed March, 2007.
2. Frishman WH, Grattan JG, Mamtani R. Alternative and complementary medical approaches in the prevention and treatment of cardiovascular disease. *Curr Prob Cardiol* 2005;**30**:383–459.
3. Arthur HM, Patterson C, Stone JA. The role of complementary and alternative therapies in cardiac rehabilitation: a systematic evaluation. *Eur J Cardiovasc Prev Rehabil* 2006;**13**:3–9.
4. Luskin FM, Newell KA, Griffith M, Holmes M, Telles S, Marvasti FF, et al. A review of mind-body therapies in the treatment of cardiovascular disease. Part 1. Implications for the elderly. *Altern Ther Health Med* 1998;4:46–61.
5. Stenlund T, Lindstrom B, Granlund M, Burell G. Cardiac rehabilitation for the elderly: Qi gong and group discussions. *Eur J Cardiovasc Prev Rehabil* 2005;**12**:5–11.
6. Brown RP, Gerbarg PL. Sudarshan kriya yogic breathing in the treatment of stress, anxiety, and depression. Part I. Neurophysiologic model. *J Altern Complement Med* 2005;**11**:189–201 [Erratum appears in J Altern Complement Med. 2005 April; 11(2):383–4]. [review] [92 refs].
7. Stetter F, Kupper S. Autogenic training: a meta-analysis of clinical outcome studies. Applied Psychophysiol Biofeedback. 2002;27:45–98. Available from: http://www.wkap.nl/journalhome.htm/1090-0586.
8. Astin JA, Forys K. Psychosocial determinants of health and illness: integrating mind, body, and spirit. *Adv Mind Body Med* 2004;**20**:14–21.
9. Benson H. The relaxation response: therapeutic effect. *Science* 1997;**278**:1694–5.
10. Buselli EF, Stuart EM. Influence of psychosocial factors and biopsychosocial interventions on outcomes after myocardial infarction. *J Cardiovasc Nurs* 1999;**13**:60–72.
11. Vogel JHK, Bolling SF, Costello RB, Guarneri EM, Krucoff MW, Longhurst JC, et al. Integrating complementary medicine into cardiovascular medicine: a report of the american college of cardiology foundation task force on clinical expert consensus documents (writing committee to develop an expert consensus document on complementary and integrative medicine). *J Am Coll Cardiol* 2005;**46**:184–221.
12. Ai AL, Bolling SF. The use of complementary and alternative therapies among middle-aged and older cardiac patients. *Am J Med Qual* 2002;**17**:21–7.
13. Yeh DP. Use of complementary therapies in patients with cardiovascular disease. *Am J Cardiol* 2006;**98**:673–80.
14. Pharand C, Ackman ML, Jackevicius CA, Paradiso-Hardy FL, Pearson GJ. Use of OTC and herbal products in patients with cardiovascular disease. *Ann Pharmacother* 2003;**37**:899–904.
15. Lenhart SE, Nappi JM. Vitamins for the management of cardiovascular disease: a simple solution to a complex problem? *Pharmacotherapy* 1999;**19**:1400–14.
16. Ernst E. Cardiovascular adverse effects of herbal medicines: a systematic review of the recent literature. *Can J Cardiol* 2003;**19**:818–27.
17. Vivekananthan DP, Penn MS, Sapp SK, Hsu A, Topol EJ. Use of antioxidant vitamins for the prevention of cardiovascular disease: meta-analysis of randomised trials. *Lancet* 2003;**361**:2017–23.
18. Gillum RF, Mussolino M, Madans JH. The relation between fish consumption, death from all causes, and incidence of coronary heart disease: the NHANES I epidemiologic follow-up study. *J Clin Epidemiol* 2000;**53**:237–44.
19. Liu EH, Turner LM, Lin SX, Klaus L, Choi LY, Whitworth J, et al. Use of alternative medicine by patients undergoing cardiac surgery. *J Thorac Cardiovasc Surg* 2000/8;**120**:335–41.

20. Wood MJ, Stewart RL, Merry H, Johnstone DE, Cox JL. Use of complementary and alternative medical therapies in patients with cardiovascular disease. *Am Heart J* 2003;**145**:806–12.
21. Barraco D, Valencia G, Riba AL, Nareddy S, Draus C, Schwartz SM. Complementary and alternative medicine (CAM) use patterns and disclosure to physicians in acute coronary syndromes patients. *Complement Ther Med* 2005;**13**:34–40. Available from: http://resolver.scholarsportal.info/resolve/09652299/v13i0001/34_caamuppiacsp&form=pdf&file=file.pdf.
22. Hartel U, Volger E. Use and acceptance of classical natural and alternative medicine in germany—findings of a representative population-based survey. *Forsch Komplementarmed Klass Naturheilkd* 2004;**11**:327–34.
23. Lonroth HL, Ekholm O. Alternative therapies in denmark—use, users and motives for the use. *Ugeskr Laeger* 2006;**168**:682–6.
24. Tindle HA, Davis RB, Phillips RS, Eisenberg DM. Trends in use of complementary and alternative medicine by US adults: 1997–2002. *Altern Ther Health Med* 2005;**11**:42–9.
25. Foltz V, St Pierre Y, Rozenberg S, Rossignol M, Bourgeois P, Joseph L, et al. Use of complementary and alternative therapies by patients with self-reported chronic back pain: a nationwide survey in Canada. *Joint Bone Spine* 2005;**72**:571–7.
26. Upchurch DM, Chyu L. Use of complementary and alternative medicine among American women. *Womens Health Issues* 2005;**15**:5–13.
27. Astin JA. Why patients use alternative medicine: results of a national study. *JAMA* 1998;**279**:1548–53.
28. Fautrel B, Adam V, St-Pierre Y, Joseph L, Clarke AE, Penrod JR. Use of complementary and alternative therapies by patients self-reporting arthritis or rheumatism: results from a nationwide Canadian survey. *J Rheumatol* 2002;**29**:2435–41.
29. Astin J, Pelletier K, Marie A, Haskell W. Complementary and alternative medicine use among elderly persons: one-year analysis of a blue shield medicare supplement. *J Gerontol A Biol Sci Med Sci* 2000;**55**:M4–9.
30. Li FX, Verhoef MJ, Best A, Otley A, Hilsden RJ. Why patients with inflammatory bowel disease use or do not use complementary and alternative medicine: a Canadian national survey. *Can J Gastroenterol* 2005;**19**:567–73.
31. Sparber A, Bauer L, Curt G, Eisenberg D, Levin T, Parks S, et al. Use of complementary medicine by adult patients participating in cancer clinical trials. *Oncol Nurs Forum* 2000;**27**:623–30.
32. Canadian Association of Cardiac Rehabilitation. *Canadian guidelines for cardiac rehabilitation and cardiavascular disease prevention: enhancing the science, refining the art*. Winnipeg: MB: CACRC; 2004.
33. Dillman DA. *Mail and internet surveys: the tailored design method*. 2nd ed New York: John Wiley & Sons, Inc; 2000.
34. Nelson CL, Herndon JE, Mark DB, Pryor DB, Califf RM, Hlatky MA. Relation of clinical and angiographic factors to functional capacity as measured by the duke activity status index. *Am J Cardiol* 1991;**68**:973–5.
35. Hlatky MA, Boineau RE, Higginbotham MB, Lee KL, Mark DB, Califf RM, et al. A brief self-administered questionnaire to determine functional capacity (the duke activity status index). *Am J Cardiol* 1989;**64**:651–4.
36. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;**67**:361–70.
37. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The validity of the hospital anxiety and depression scale. An updated literature review. *J Psychosom Res* 2002;**52**:69–77.
38. Moss-Morris R, Weinman J, Petrie KJ, Horne R, Cameron LD, Buick D. The revised illness perception questionnaire (IPQ-R). *Psychol Health* 2002;**17**:1–16.
39. Walker SN, Sechrist KR, Pender NJ. The health-promoting lifestyle profile: development and psychometric characteristics. *Nurs Res* 1987;**36**:76–81.
40. Sechrist KR, Walker SN, Pender NJ. Development and psychometric evaluation of the exercise benefits/barriers scale. *Res Nurs Health* 1987;**10**:357–65.
41. Innes KE, Bourguignon C, Taylor AG. Risk indices associated with the insulin resistance syndrome, cardiovascular disease, and possible protection with yoga: a systematic review. *J Am Board Fam Pract: Am Board Pract* 2005;**18**:491–519.
42. van Dixhoorn J, White A. Relaxation therapy for rehabilitation and prevention in ischaemic heart disease: a systematic review and meta-analysis. *Eur J Cardiovasc Prev Rehabil* 2005;**12**:193–202.
43. Daly J, Sindone AP, Thompson DR, Hancock K, Chang E, Davidson P. Barriers to participation in and adherence to cardiac rehabilitation programs: a critical literature review. *Prog Cardiovasc Nurs* 2002;**17**:8–17.
44. O'Brien Cousins S. My heart couldn't take it: older women's beliefs about exercise benefits and risks. *J Gerontol B Psychol Sci Soc Sci* 2000;**55**:P283–94.
45. Grace SL, Abbey SE, Shnek ZM, Irvine J, Franche RL, Stewart DE. Cardiac rehabilitation. II. Referral and participation. *Gen Hosp Psychiatry* 2002;**24**:127–34.
46. Ashton KC, Saccucci MS. A follow-up study of ethnic and gender differences in cardiac rehabilitation. *Rehabil Nurs* 1996;**21**(187–91):195.
47. Allen JK, Scott LB, Stewart KJ, Young DR. Disparities in women's referral to and enrollment in outpatient cardiac rehabilitation. *J Gen Intern Med* 2004;**19**:747–53.
48. Lavie CJ, Milani RV, Cassidy MM, Gilliland YE. Effects of cardiac rehabilitation and exercise training programs in women with depression. *Am J Cardiol* 1999;**83**(1480–3):A7.
49. Jayasinghe SR. Yoga in cardiac health (a review). *Eur J Cardiovasc Prev Rehabil* 2004;**11**:369–75.
50. Moore SM. Women's views of cardiac rehabilitation programs. *J Cardiopulm Rehabil* 1996;**16**:123–9.
51. Dolansky MA, Moore SM, Visovsky C. Older adults' views of cardiac rehabilitation program: is it time to reinvent? *J Gerontol Nurs* 2006;**32**:37–44.
52. Ades PA, Maloney A, Savage P, Carhart Jr RL. Determinants of physical functioning in coronary patients: response to cardiac rehabilitation. *Arch Intern Med* 1999;**159**:2357–60.
53. Moore SM, Kramer FM. Women's and men's preferences for cardiac rehabilitation program features. *J Cardiopulm Rehabil* 1996;**16**:163–8.
54. Audette JF, Jin YS, Newcomer R, Stein L, Duncan G, Frontera WR. Tai chi versus brisk walking in elderly women. *Age Ageing* 2006;**35**:388–93.
55. van Melle JP, de Jonge P, Spijkerman TA, Tijssen JG, Ormel J, van Veldhuisen DJ, et al. Prognostic association of depression following myocardial infarction with mortality and cardiovascular events: a meta-analysis. *Psychosom Med* 2004;**66**:814–22.
56. Horsten M, Mittleman MA, Wamala SP, Schenck-Gustafsson K, Orth-Gomer K. Depressive symptoms and lack of social integration in relation to prognosis of CHD in middle-aged women. the stockholm female coronary risk study. *Eur Heart J* 2000;**21**:1072–80.