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Stress Management and Relaxation Techniques use among underserved inpatients in an inner city hospital

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KEYWORDS
Health literacy;
Complementary and alternative medicine;
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Summary
Objective: Little is known about the use of Stress Management and Relaxation Techniques (SMART) in racially diverse inpatients. We hope to identify socioeconomic status (SES) factors, health behavior factors, and clinical factors associated with the use of SMART.
Design and main outcome measures: We conducted a secondary analysis of baseline data from 623 hospitalized patients enrolled in the Re-Engineered Discharge (RED) clinical trial. We assessed socio-demographic characteristics and use of SMART. We used bivariate and multivariate logistic regression to test the association of SMART with socio-demographic characteristics, health behaviors, and clinical factors.
Results: A total of 26.6% of participants reported using SMART and 23.6% used mind body techniques. Thirty six percent of work disabled patients, 39% of illicit drug users, and 38% of participants with depressive symptoms used SMART. Patients who both reported illicit drug use and screened positive for depression had significantly increased odds of using SMART [OR = 4.94, 95% CI (1.59, 15.13)]. Compared to non-Hispanic whites, non-Hispanic blacks [0.55 (0.34—0.87)] and Hispanic/other race individuals [0.40 (0.20—0.76)] were less likely to use SMART.
Conclusions: We found greater utilization of SMART among all racial groups compared to previous national studies. In the inner city inpatient setting, patients with depression, illicit drug use, and work disability reported higher rates of using SMART.

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Introduction

Racially diverse patients with low socioeconomic status (SES) and chronic illnesses disproportionately experience stress, which adversely affects their physical and mental health.[1–3] Self-administered Stress Management and Relaxation Techniques (SMART) are effective in alleviating stress and related conditions such as depression, pain, and anxiety.[4–9] Furthermore, emerging evidence indicates that SMART are feasible and helpful to patients in reducing stress and improving pain, depression, and other chronic conditions.[8,10–12] This research study measures the prevalence of SMART and the factors associated with SMART use in a racially diverse inner-city hospitalized population.

Health behaviors and clinically related factors may influence the use of SMART. Factors such as work disability, substance abuse, or depression may exacerbate stress or limit the capacity to engage in SMART.[13,14] Since many clinicians recommend stress management therapies in treating patients, it is important to determine what contributes to a patient using SMART so clinicians can appropriately counsel patients. However, few studies to date have examined the association of health behaviors and clinically related factors on the use of SMART among inner city racially diverse patients.[15,16]

SMART include mind-body therapies, such as yoga, deep breathing, and meditation, as well as other modalities. In 2007, the National Health Interview Survey (NHIS) reported that 19% of U.S. adults used mind-body techniques, with use being lower in African American (15%) and Hispanic (11%) adults than in non-Hispanic white adults (21%).[9] Although the NHIS reports on national prevalence, it may not have captured racially diverse patients who utilize an inner-city hospital for their medical needs. Furthermore, little is known about the factors related to the use of mind body therapies in racially diverse patients.

In addition to the prevalence of SMART, this analysis seeks to identify SES factors, health behavior factors, and clinical factors associated with the use of SMART. Based on previous studies, we hypothesize that patients with depression would be more likely to use SMART.[17] Conversely, patients with poor health behaviors, such as those with heavy alcohol use would be less likely to use them.[18] Finally, due to work disability, racially diverse inpatients may lack the financial resources for SMART. We hypothesize that those patients who are work disabled will report lower rates of SMART compared to employed patients.

Since stress can negatively affect the treatment of chronic health conditions, it is important to understand which patients are not accessing SMART. By reporting the prevalence of SMART among this population, we hope to guide clinicians to recognize which patients are using SMART and the factors related to SMART use.

Methods

Study sample

The study sample consists of participants in the Re-Engineered Discharge clinical trials at Boston Medical Center (BMC), Boston MA.[19,20] BMC is an urban teaching hospital, providing care to an underserved, ethnically diverse population of patients. The RED trials were conducted between 2009 and 2010. They tested a newly designed discharge process with inpatients at BMC. Patients 18 years of age and older with the ability to speak English were included in the study. Patients were excluded if they were: admitted to BMC from a skilled nursing facility or other hospital, admitted for a planned hospitalization, or were on hospital precautions, on suicide watch, deaf, or blind. Patients from a skilled nursing facility or other hospital were excluded because the primary outcome of the study was readmission following discharge home. The sample used in the current analyses was restricted to RED participants who were administered questions about their complementary and alternative medicine (CAM) use at their baseline interview by a trained research assistant ($N = 623$). This study was approved by the BMC Institutional Review Board.

Baseline measures

The socio-demographic data included age, gender, employment (work disabled, retired, unemployed or full-or-part-time employed), education level (less than high school, high school/equivalent, at least some college), income (unknown/refused, none-$19,999, $20,000—39,999, $40,000—74,000, >$75,000), insurance (private or government/free), race/ethnicity (Non-Hispanic Black, Non-Hispanic White, and Hispanic/Other, including Asian/Pacific Islanders, American Indians), and marital status (married or single, including divorced, separated, and widowed). Health literacy was measured using the Rapid Estimate of Adult Literacy in Medicine (REALM) scale.[21] The REALM has high criterion validity and test-retest reliability 0.99 ($p < .001$). Participants with a REALM score of 60 and below are categorized as having low health literacy (8th grade and below), while those with scores of 61—66 are considered to have high health literacy (high school). Dichotomous variables (yes/no) were also included for English as a primary language, and born in the US.

Health behaviors were denoted by the following dichotomous (yes/no) variables: having a primary care provider (PCP) at time of admission; excessive alcohol use (''In the past year, have you had [men: 5 or more; women: 4 or more] alcoholic beverages (drinks) in a day?''); and use of illicit drugs (an illicit drug or use of a prescription medication for non-medical purposes) in the past year. Depressive symptoms were measured with the Patient Health Questionnaire 9 (PHQ-9). Its validity and reliability as a diagnostic measure, as well as its utility in assessing depression severity, are well-established.[22] We used the standard PHQ-9 cut-point of 5 to classify patients as having no depressive symptoms (PHQ score < 5) or mild to severe depressive symptoms (PHQ score ≥ 5).[19,22]

Co-morbidity was measured with the Charlson Co-morbidity Index, where health conditions (classified by ICD-9 code) are assigned a score depending on the risk of death associated with the condition, and the scores are summed into a total score that predicts mortality.[23] Additionally, we measured the number of hospital visits (including hospitalizations and emergency visits) in the 6 months prior

to the index admission to determine outliers (those with 2 or more visits in the 6 month period). We dichotomized (yes/no) the number of hospital visits variable for the final analyses.

Outcome

Participants were asked if they had ''ever used any stress management or relaxation techniques for themselves (yes/no/don't know)''. Participants who answered positively were asked additional questions about the type of stress management or relaxation techniques they used such as mind-body techniques (deep breathing exercises, meditation, and yoga). Finally, participants were asked about other relaxation techniques in an open-ended manner. Responses to the open ended question were categorized after further review by research staff. Those who reported not knowing about their SMART use were excluded from the analysis. These questions were modeled after questions administered to individuals participating in national prevalence studies.

Statistical analyses

Characteristics of participants who reported SMART use were compared to those who did not using chi-square tests for categorical variables, *t*-tests for continuous variables, and Mann—Whitney *U* test for continuous non-parametric variables. Multivariable analysis was performed using logistic regression, and odds ratios (OR) and 95% confidence intervals (CI) were reported. Variables that were independently associated with SMART at a *p*-value of 0.2 or less were considered for inclusion into the multivariable regression models. Variables that met these criteria were included in the regression model using a manual stepwise selection process (variables included one at a time in order of lowest to highest crude *p*-value, and excluded if the adjusted *p*-value exceeded the 0.2 threshold). To evaluate the combined effects of depressive symptoms and illicit drug use on SMART use, we created three dummy variables (both depressive symptoms and use of illicit drugs, depressive symptoms only, illicit drug use only), with the referent group being neither depressive symptoms nor illicit drug use. Studies have shown high depression rates among illicit drug users.[24] Since many patients use SMART for depression, we were not sure whether drug users were using SMART because of depression or because of their drug use. Thus, we wanted to evaluate the combined effects of illicit drug use and depression.

To avoid possible collinearity between health literacy and education, we calculated the variance inflation factor (VIF) and tolerance values for the covariates included in the multivariable logistic regression. The maximum VIF value in the set was 1.34, which indicated that no collinearity issues were present within this sample. While English as a primary language and being born in the US were not collinear (tolerance = 0.76, VIF = 1.32), English as a primary language was more strongly associated with SMART, and thus was included in the final regression model. All statistical analyses were performed using SAS Version 9.3.

Results

Of the full sample of 802 RED participants, 623 were administered the CAM questions. The 179 participants who did not complete the study were enrolled prior to the incorporation of the CAM questions. Compared to the 179 RED participants who were not included in our analyses, those who were included had significantly lower hospitalization use and higher health literacy, but did not differ on other socio-demographic, health behavior, or diagnosis-related characteristics.

The mean age for all participants was 49 years old and individuals were 52% male, 52% non-Hispanic Black, and 19% Hispanic/other. Sixty-two percent had a high school or less education level (see Table 1). Approximately a quarter of the respondents reported using SMART (26.6%). Unadjusted analyses revealed that participants of Non-Hispanic white race, those with a higher education level, health literacy, and a combination of illicit substance use and depressive symptoms were significantly more likely to report using SMART than their counterparts. Of these techniques, deep breathing and meditation were reported by twice as many participants as yoga (13% versus 6.7%, respectively) (Table 2). Among the 166 relaxation technique users, 103 (62%) reported using one technique, 41 (24.7%) reported using two techniques, 18 (10.8%) reported three techniques.

The final multivariable model included age, gender, race employment status, education, health literacy, English as a primary language, illicit drug use, having a PCP, Charlson Comorbidity Index, and depressive symptoms. In multivariable analyses, SES characteristics, work disability, illicit drug use, and depressive symptoms were significantly associated with the use of SMART. Specifically, participants with a high school education or less, those who were non-Hispanic black or Hispanic/other were half as likely to use relaxation or stress management techniques as their counterparts (see Table 3). By contrast, those on work disability were almost twice as likely to use SMART compared to full-time employed patients [OR = 1.95, 95% CI (1.15, 3.48)]. Moreover, participants with mild to severe depressive symptoms or illicit drugs use were also more likely to use SMART.

In a further analysis of the combined effects of depressive symptoms and illicit drug use on SMART use, we found that participants who both screened positively for depressive symptoms and reported illicit drug use were significantly more likely to use SMART [adjusted OR = 4.94, 95% CI (1.59, 15.13)] compared to participants who neither screened positively for depression nor used illicit drugs. By comparison, participants who only used illicit drugs and those who only screened positively for depression were more likely to use SMART than those who neither screened positively nor used illicit drugs, but the associations were less strong (ORs = 2.36, 95% CI (1.32, 4.19) and 1.81, 95% CI (0.97, 3.25), respectively). In this model, the associations between the other covariables and use of SMART remained the same as those presented Table 3 except for being work disabled which increased [OR = 2.15, 95% CI (1.25, 3.74)].

Table 1 Participant characteristics and factors associated with Stress Management or Relaxation Techniques (SMART) among 623 hospitalized patients.

Socio-demographic factor	$n = 623$ (%)	Stress Management or Relaxation Technique $n = 166$ (26.6%)	p-Value
Gender			0.39
Male	326 (52)	91 (55)	
Female	296 (48)	74 (45)	
Race			<0.01
Non-Hispanic Black	325 (52)	72 (23)	
Hispanic other	118 (19)	24 (21)	
Non-Hispanic White	180 (29)	70 (39)	
Employment[a]			0.01
Disabled	174 (28)	62 (36)	
Retired	89 (14)	24 (27)	
Unemployed	170 (27)	34 (21)	
Employed	190 (31)	46 (25)	
Education[a]			<0.01
Less than high school	146 (24)	35 (24)	
High school	230 (38)	45 (20)	
College	232 (38)	80 (35)	
Income			0.64
Unknown/refused	226 (38)	53 (32)	
None to $19,999	213 (35)	59 (36)	
$20,000—39,999	75 (13)	20 (12)	
$40,000—74,999	56 (9)	17 (10)	
$75,000+	32 (5)	11 (7)	
Insurance status			0.89
Private	206 (33)	54 (27)	
Government/free	412 (67)	111 (27)	
Health literacy (REALM)			<0.01
0—60	264 (42)	42 (16)	
61+	359 (58)	124 (35)	
English as the primary language[a]			0.01
Yes	548 (89)	155 (29)	
Marital status			0.27
Single	472 (77)	130 (78)	
Married	139 (23)	32 (19)	
Born in the US[a]			0.02
Yes	485 (78)	140 (29)	
Health behaviors			
Illicit drug use[a,c]			<0.01
Yes	108 (17)	41 (39)	
Has primary care provider[a]			0.09
Yes	513 (83)	144 (28)	
Alcohol use[b]			0.52
Yes	165 (27)	47 (29)	
Clinically related			
Depressive symptoms (PHQ-9)[a]			0.0128
Mild to severe	99 (16)	36 (22)	
None	519 (84)	129 (78)	
Hospital or ER in last 6 months			0.52
Yes	93 (15)	22 (24)	
Continuous variables			
Age: mean (SD)	49.33 (13.82)	49.64 (14.26)	0.81
Charlson Comorbidity Index: mean (SD)	1.88 (2.28)	1.72 (1.98)	0.45

[a] Variables that were associated with relaxation at a crude p-value of 0.2 or less were considered for inclusion into the multivariable regression.

[b] ''In the past year, have you had [men: 5 or more; women: 4 or more] alcoholic beverages (drinks) in a day?''

[c] ''Have you used any illegal drugs or Rx drugs for a non-medical use?''

Table 2 Prevalence of Stress Management and Relaxation Techniques by type of technique used.

	Total $N = 623$ n (%)	Non-Hispanic White $n = 180$	Non-Hispanic Black $n = 325$	Hispanic and other $n = 118$
Any relaxation technique[a]	166 (27)	70 (39)	72 (23)	24 (21)
Mind-body relaxation techniques		63 (35)	65 (20)	19 (16)
Deep breathing	81 (13)	32 (30)	38 (28)	11 (24)
Meditation	81 (13)	32 (31)	42 (31)	7 (16)
Yoga	42 (7)	20 (20)	18 (14)	4 (9)
Other techniques[b]	51 (8)	20 (11)	21 (18)	10 (3)

[a] Includes mind body relaxation techniques and other techniques.
[b] Includes aroma therapy, creative visualization, hot baths, bubble baths, beach noise tapes for meditation, biking, camping, body control methods, Callahan hand tapping, relaxation tapes, crocheting, smooth jazz music, chanting, cooking, counting, electric massage, exercise, God, group therapy, hypnosis, listening to music, massage, muscle relaxation imagery, pedicure, prayer, reading, reflexology, Reiki, steam room/sauna, stretching, concentrating, Tai Chi, thinking about alternatives, focusing on the moment for panic attacks, walking.

Table 3 Multivariable logistic regression model: characteristics associated with use Stress Management and Relaxation Techniques among 623 hospitalized patients.

	Odds ratio	95% CI		p-Value
Sociodemographic				
Age (in years)	0.99	0.97	1.01	0.36
Gender				0.50
Female	1.16	0.79	1.79	
Male	1.00			
Race				0.02
Non-Hispanic Black	0.55	0.34	0.87	
Hispanic/other	0.43	0.21	0.87	
Non-Hispanic White	1.00			
Employment				0.01
Disabled	1.99	1.15	3.48	
Retired	1.53	0.67	3.48	
Unemployed	0.70	0.38	1.26	
Employed (full/part time)	1.00			
Education				0.07
Less than high school	0.81	0.45	1.43	
High school	0.55	0.33	0.91	
College	1.00			
REALM (health literacy)				<0.01
Low (0—60)	0.43	0.26	0.71	
High (60+)	1.00			
English as a primary language				0.28
No	0.62	0.24	1.43	
Yes	1.00			
Health behaviors				
Illicit drug use				<0.01
Yes	2.46	1.44	4.21	
No	1.00			
Has primary care provider				0.08
Yes	1.74	0.95	3.33	
No	1.00			
Clinically related				
Charlson Comorbidity Index (cont.)	1.05	0.94	1.18	0.38
Depressive symptoms (PHQ-9)				0.02
Mild to severe depressive symptoms	1.86	1.08	3.17	
No depressive symptoms	1.00			

Discussion

We found that Non-Hispanic white patients were more likely than other race/ethnic groups to use SMART, which was similar to the other national findings.[9,25–28] However, we observed greater utilization of SMART among every race/ethnic group than the NHIS survey: 35% compared to 21% among non-Hispanic whites, 20% compared to 15% among non-Hispanic blacks, and 16% compared to 11% among non-Hispanic/Other adults.[9,25–28] Nonetheless, more research is needed to determine the mediating factors that facilitate or impede SMART use, such as cultural beliefs or social networks.[29] In this sample of racially diverse inpatients, we found that SES and factors such as work disability and depression were associated with use of SMART. We found that illicit drug use but not alcohol consumption was associated with the use of SMART. Moreover, participants who both reported illicit drug use and screened positive for depression were more likely to use SMART compared to participants who neither reported illicit drug use nor screened positively for depression.

Mind-body technique use has increased in prevalence among patients with psychiatric illnesses.[30–33] Clinical studies document efficacy and safety of mind-body therapies and their effects for patients with depression.[34] Our investigation indicates that hospitalized patients with mild to severe depressive symptoms have almost twice the odds of using relaxation techniques as a specific CAM modality. Moreover, our sub-analysis found that inpatients who both reported illicit drug use and screened positively depression were almost five times as likely to use SMART. It is unknown whether patients self-initiated the use of SMART for their depression or drug use.

Little has been written thus far regarding the relationship between work disability and the use of SMART.[35] Our analysis reveals a strong positive association between work-disability status and using SMART. Work disability can be precipitated by a multitude of medical, physical, and psychological factors, such as stress.[36] It is important for health care providers to acknowledge the methods that their patients utilize to alleviate stress. SMART, among other CAM modalities, are often overlooked as potential treatment options. It is unknown if SMART facilitates or creates barriers to returning to employment in work disabled patients.

We found a positive association between SMART use and illicit drug use. Among women who either had or were at risk of HIV infection, CAM use was associated with less illicit drug use, and CAM users were typically more health conscious and may have used CAM therapies as drug abuse treatment.[8,37] Another study found that 45% of intravenous drug users also used different CAM therapies, most commonly mind-body techniques.[38] In our sample, patients who reported illicit drug use also were more likely to use SMART. This finding may be particular to the urban, racially diverse population of inpatients. However, if patients with substance abuse conditions are using SMART as an adjunct to substance abuse treatment or to help maintain abstinence, clinical studies are important to assess which SMART hold the best promise for success.[39–41]

We found that heavy alcohol consumption was not associated with the use of SMART. Previous data is mixed regarding the association between alcohol consumption and CAM use, with some reporting a positive association,[9] while others reported an inverse relationship.[42] Still other studies have found no association between the two factors.[43–45] Perhaps one reason for the lack of consensus among studies is the use of different outcome measures to quantify the amount of alcohol a patient consumed. In our study, we looked at patients who reported drinking more than 5 drinks per day, indicating heavy drinking.

Our study has several limitations. We did not ask specifically about the use of prayer among our patients. Non-Hispanic black and Hispanic patients may be using prayer as a culturally acceptable SMART, thus underestimating the true prevalence of SMART in our sample. We also did not ask about the use of stress reduction techniques used by patients such as smoking cigarettes. Also, the alcohol question only captures excessive use of alcohol. The non-specificity of the SMART outcome variable captures if a patient ever used SMART but it did not capture current SMART behavior or whether patients felt that the SMART helped their stress. However, this question mirrors that of the national studies. Since the RED trials included only English speaking patients, we do not know if our results generalize to non-English speaking patients. It is also possible that patients did not reveal their SMART use to the interviewer, resulting in underestimation of SMART use. In addition, we are unable to assess whether patients who were work disabled used SMART because they had more time to use SMART compared to their non-disabled counterparts, or if they used SMART to alleviate stress precipitated by work disability. Data were only collected among RED participants and thus might not be generalizable to the general population. Finally, BMC has an Integrative Medicine service which may influence study results as there are many programs offered to BMC patients for SMART and other Integrative Medicine services.

In conclusion, we found that approximately one-quarter of inpatients at BMC used SMART. Mind-body therapies and SMART initiatives have been introduced in a variety of health care settings and have been shown to decrease pain, depression, and hypnotic medication prescriptions, as well as diminish the cost of care.[46] Unlike other provider-delivered CAM techniques, self-delivered SMART are lower cost to the participant. Specifically, CAM constitutes 11.2% of total out-of-pocket expenditures on health care annually, and only 0.6% of this sum is attributable to relaxation techniques.[47] Further investigation into the barriers and predisposing factors identified in this study is needed to assess how and if these techniques are beneficial to these and other patient populations.

Conflicts of interest

We report no conflicts of interest.

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