

# Mindfulness-Based Stress Reduction in Therapeutic Community Treatment: A Stage 1 Trial

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**Objective:** This trial compared Mindfulness-Based Stress Reduction, adapted for therapeutic community treatment (MBTC), with treatment as usual (TAU) for reducing stress and increasing retention in a residential facility for substance use disorders. **Method:** Four-hundred and fifty-nine participants, who met DSM-IV criteria for substance dependence were recruited

(TAU = 164, MBTC = 295). **Results:** A survival analysis of time to dropout did not show a significant difference between groups, however level of participation in MBTC was associated with decreased likelihood of dropout ( $p < .01$ ), and higher Symptoms of Stress Inventory (SOSI) scores at baseline were associated with increased likelihood of dropout ( $p = .03$ ). **Conclusion:** The association between retention and level of stress on intake as well as level of participation in MBTC provides support for further research on integrating MBTC into therapeutic community treatment.

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**Keywords** Behavioral therapies trial, mindfulness-based stress reduction (MBSR), retention, stress, therapeutic community

## INTRODUCTION

Therapeutic communities (TCs) are a widely recognized method for treating substance use disorders (1). The major goal of the TC is to encourage and support social learning, which in turn fosters changes in world view and self-image (2). TCs provide a highly-structured environment in which the community is an agent for behavior change. Studies have shown that individuals who complete TC treatment have lower levels of substance use, criminal behavior, unemployment, and depression than they had prior to treatment (3, 4). However, attrition from TCs is often as high as 50%, with the greatest dropout rate occurring within the first 30 to 60 days (5). One potential factor influencing TC retention is stress. While little data exist to link stress to TC treatment, empirical data documenting stress in similar restrictive, hierarchical environments provide strong theoretical evidence for the relationship (6–8).

Mindfulness-Based Stress Reduction (MBSR) is a program designed to foster attention to the present-moment experience. Originally developed to teach patients with chronic physical and mental health problems to improve their lives, MBSR is now used as an adjunct to treatment in a wide-range of disorders (9, 10). MBSR is remarkably congruent with TC philosophy. Whereas the TC teaches that *right living* is being in the personal present, the here and now, mindfulness involves being aware and in the present moment. Consistent with the TC modality, mindfulness practices encourage the practitioner to see the self as a whole person rather than as an illness or affliction, identifying what is *right* rather than what may be *wrong* (11). Results of two prior studies of MBSR in TC treatment demonstrated: (1) positive changes in self-reported coping styles and psychological symptoms in a quasi-experimental study (12); and (2) statistically significant decreases in awakening salivary cortisol in a pre-post design trial (13). The current study, a Stage 1b trial, tests the efficacy of Mindfulness-Based Therapeutic Community (MBTC), MBSR adapted for the TC, for reducing stress and increasing retention. The historical control condition of treatment as usual was chosen because the communal nature of the TC precludes a randomized control.

## METHODS

### Participants

Four-hundred and fifty-nine clients at the Houston facility of Cenikor Foundation, a long-term residential TC for substance abuse recovery, participated in the study: 164 in the historical control, and 295 in the intervention group. All clients met DSM-IV criteria for substance dependence. Within the first 72 hours of admission, clients were approached by trained research assistants and invited to participate in a research study exploring recovery in the TC setting (historical control) or evaluating a program of stress reduction (intervention group). Participants provided informed consent. The study was approved by the Committee for the Protection of Human

TABLE 1

Demographic and pretreatment characteristics (%)		
Pretreatment Characteristics	HC	MBSR
Gender		
Male	76.2	85.8
Female <sup>1</sup>	23.8	14.2
Ethnicity		
White	57.3	53.6
Black	29.9	29.8
Hispanic and other	12.8	16.6
Age in years <sup>2</sup>	36.2	34.3
Married	14.0	16.2
Education: High school or more	74.6	75.3
Criminal justice referral	27.5	28.0
Primary drug		
Cocaine	33.3	33.7
Marijuana	21.0	25.8
Alcohol	21.0	17.2
Prior drug treatment	71.7	69.3
Ever been prescribed psychiatric medications	3.6	5.9
Child of substance abuser	61.9	65.9

<sup>1</sup>Significant difference between two groups

<sup>2</sup>Age in years reported as a mean

Subjects, The University of Texas Health Science Center at Houston.

### Measures and Procedures

Cenikor collects demographic and pretreatment information at intake; during the course of the study, however, research assistants gathered these data for study subjects (i.e., variables listed in Table 1).

Measures were gathered on admission and at months 1, 3, 6, and 9. The Symptoms of Stress Inventory (SOSI) was used to measure physical, psychological, and behavioral responses to stress (14). The SOSI is a factor analytically derived inventory that measures 10 components of the stress response: Peripheral Manifestations, Cardiopulmonary Symptoms (Arousal and Upper Respiratory Symptoms), Central Neurological Symptoms, Gastrointestinal Symptoms, Muscle Tension, Habitual Patterns, Depression, Anxiety/Fear, Emotional Irritability, and Cognitive Disorganization. Respondents rated the frequency with which they experienced various stress related symptoms on a 5-point scale, ranging from “never” to “frequently,” during the week. Salivary cortisol determinations were used to measure physiologic response to stress. Saliva samples were obtained at 0, 15, 30, and 45 minutes after awakening at each of the five study time points. The samples were obtained by research assistants using the Salivette sampling device (Sarstedt, Inc.) and assayed using Cortisol RIA kits (ICN Diagnostics, Inc.).

Retention data were gathered by tracking the participants' continued involvement in Cenikor, or dropout, at each study time point. For purpose of analysis, this variable was defined as the number of days until dropout from the treatment center. All data were collected by research assistants who received two days of training in the reliable administration of the instruments and method of saliva collection by experienced trainers from the Substance Abuse Research Center at the University of Texas Health Science Center School of Medicine.

To capture MBTC dose response, trained teachers assessed class participation by recording class attendance and the extent to which the participant was engaged in the class. Level of engagement was measured on a 5-point scale (1 = never to 5 = very often) in response to the question, "To what extent did the participant engage in class?" Participation level was based on calculation of the product of the number of class hours attended multiplied by the average level of engagement score for all classes attended, yielding a possible score from 1 to 85.

### Treatments

Cenikor, an 18-month residential program, meets the state Standard of Care designated as Adult Residential TC, which specifies 6 hours of treatment service per week to include chemical dependency counseling, life skills training, and cognitive restructuring. The program also includes vocational training. Clients have a 4 to 6 week orientation period to learn the "rules and tools" of TC methodology prior to entering the primary treatment phase, when individual and group counseling are intensified and vocational training begins. Reentry, the final phase of treatment, focuses on achieving a successful transition to the outside world. Participants in the historical control group ( $n = 164$ ) received TC treatment as usual during the first year of the study. Participants in the MBTC group ( $n = 295$ ) received the intervention guided by a structured treatment manual. The intervention, modeled after the 8-session MBSR program at the Stress Reduction and Relaxation Clinic at the University of Massachusetts Medical Center (9), was adapted for the TC environment. Classes included the content specified for each session with the addition of consistent content from the TC curriculum. As an example, the first class addresses reawakening to life or reducing the tendency to operate on automatic pilot. The corollary in TC treatment philosophy is the belief that *right living* is being in the personal present. Each class session included time for meditation practice and discussion of the utility of the techniques to the experience of recovery in a TC. Details of the MBTC intervention, with class content, have been described previously (15).

Classes began in orientation when attrition is generally highest. Class sessions were reduced in number, 6 instead of 8, and increased in length, two and a half to three hours instead of 90 minutes, to assure that participants received the full 17 hours before moving to primary treatment. Classes were held twice a week for the first two weeks, and once a week for the next two weeks. The average class size was 15 individuals who par-

ticipated as a cohort, 20 cohorts overall. New MBTC classes began every two weeks. In addition to formal classes, participants were encouraged to practice meditation six days a week for 45 minutes. Workbooks for written assignments and access to a meditation room with audio compact discs to guide meditation practice were provided. Participants were also encouraged to use mindfulness concepts outside of formal practice when they perceived situations to be stressful in their daily lives.

MBTC teachers were experienced mindfulness practitioners who completed the 7-day intensive training program for health professionals offered by the Center for Mindfulness, 6 hours on therapeutic community method, an intensive orientation to the use of the manual, and a 4-week internship. Every class was audio-taped, and the tapes reviewed by two individuals who are experienced with MBSR to monitor treatment fidelity.

### Data Analyses

Baseline comparisons of demographic characteristics for the historical control and intervention groups were conducted with the two sample t-test for continuous variables and the chi-square test for categorical variables. Comparisons of change in SOSI total mean and subscale scores over time were conducted with linear mixed models for repeated measures (16). Similar analysis was used to assess change in cortisol values over time, except the model for cortisol contained two repeated time factors: change among specimens within study visit and change over the five study visits. A natural logarithmic transformation of the cortisol values was conducted prior to analysis due to those values not approximating a normal distribution. The average coefficient of variation for the cortisol samples was less than 10%, indicating that there was acceptable error in the method.

Survival analysis comparing time to dropout by group was conducted with the log-rank test. In addition, a Cox proportional hazards regression model (17) was used to compare survival for the two groups after adjusting for legal status, gender, and baseline SOSI total mean, or subscale score for muscle tension, or emotional irritability. The level of significance for all statistical tests was set at  $p < .05$ . All statistical analyses were performed using SAS for Windows, version 9.1 (17).

### RESULTS

Table 1 provides a comparative analysis of the demographics of the two groups. There were no statistically significant demographic differences between the two groups, with the exception of gender. Total mean SOSI scores decreased significantly over the 9 months of the study ( $p < .01$ ) for both groups. Although the intervention group showed a greater reduction in total stress during the first 3 months, the overall time trends for the two groups were not significantly different ( $p = .14$ ) (Fig. 1). Females consistently had higher SOSI mean scores over time ( $p < .01$ ). For the muscle tension and emotional irritability subscales of the SOSI, significant group by time effects were found, with the MBTC group having lower scores at 3 months compared

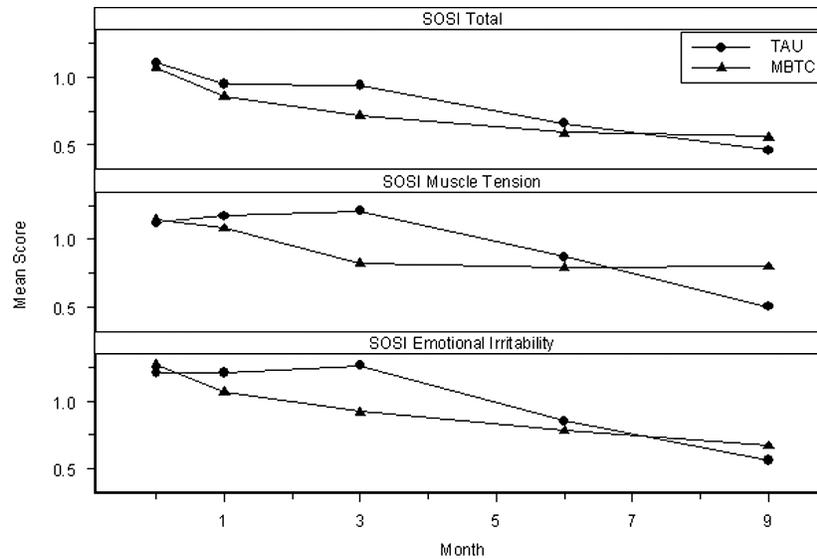


FIG. 1. Mean Symptoms of Stress Inventory (SOSI) scores over time for the treatment as usual group (TAU) and the Mindfulness-Based Stress Reduction group (MBTC). The top panel shows the mean total SOSI scores, while the bottom two panels illustrate the mean muscle tension and emotional irritability subscale scores, respectively.

to the control group ( $p = .02$  for muscle tension and  $p = .03$  for emotional irritability). As with the total mean score females scored significantly higher on both of these subscales ( $p < .02$ ). Analysis of cortisol levels indicated that the two groups had different trends over time ( $p = .03$ ). The MBTC group exhibited a steady decline over the 9 months of study, while the historical controls showed an irregular pattern of change. Overall, the historical control subjects tended to have higher cortisol values than the intervention subjects ( $p < .01$ ). Higher total mean SOSI scores were found to be associated with higher cortisol values ( $p < .01$ ). This association was found to change over time, with the strongest correlation occurring at 9 months ( $p < .01$ ). No significant differences were found in the average cortisol values for males and females.

A log-rank comparison of time to treatment center dropout (survival time) for the intervention and historical control groups did not show a statistically significant difference ( $p = .45$ ). The median survival time for the control subjects was 44 days, compared to a median of 46 days for the MBTC subjects. Cox proportional hazards regression to compare time to dropout for the two groups after adjusting for legal stipulation, gender, and baseline SOSI score also did not indicate a difference in survival for the intervention and control groups ( $p = .87$ ).

Legal stipulation and baseline SOSI score were found to affect survival. Those legally required to be in the therapeutic community were 29% less likely to dropout (hazard ratio = .71,  $p = .01$ ).

Higher total mean SOSI scores at entry were associated with an increased likelihood of dropout (hazard ratio = 1.20,  $p = .03$ ). Baseline muscle tension score was also found to be associated with an increased probability of treatment center dropout

(hazard ratio = 1.14,  $p = .02$ ). However, emotional irritability did not affect survival (hazard ratio = 1.03,  $p = .56$ ). Salivary cortisol levels at baseline were not associated with survival ( $p = .87$ ). The interaction of baseline mean SOSI score and group affiliation was not found to affect survival ( $p = .78$ ).

The mean number of class hours attended by the intervention group was 11.7 ( $SD = 6.1$ , range 0–17), while the average level of engagement score was 3.5 ( $SD = 1.6$ , range 1–5). The mean participation level for the intervention group (class hours times engagement score) was 48.4 ( $SD = 26.8$ , range 0–85). Seventy percent of the intervention subjects attended 10 or more hours of classes, with one-third attending all 17 hours. Sixty percent had an average level of engagement score  $\geq 4$ . Fifteen percent of the intervention group attended no classes, resulting in a participation level = 0. These individuals left the Cenikor program before the start of classes. Survival analysis of the intervention group indicated that after adjusting for legal stipulation, gender, and baseline total mean SOSI score, an increase in participation level was associated with a decrease in the likelihood of treatment center dropout (hazard ratio = .976,  $p < .01$ ).

## DISCUSSION

This study is the first to collect repeated measures of subjective and biological stress during the course of TC treatment and to examine these measures in relation to retention and response to a stress reduction intervention tailored for the TC environment. While the intervention and control groups both showed a decrease in stress over time, two subscales of the SOSI, muscle tension, and emotional irritability, showed significant improvement in subjects receiving the MBTC intervention.

Significant differences on these subscales occurred during the third month in treatment, a time of particular vulnerability to dropout. Change in cortisol levels showed the same pattern of results as the SOSI scores, with lower levels found in the MBTC group at three months. Consistency between these stress measures is encouraging and implies that the stress phenomenon was reliably measured in these participants. The stress-reducing benefits of MBTC appear to decrease after 3 months suggesting the need for continuing formal classes or offering “booster sessions” throughout the course of treatment.

Baseline scores on the SOSI were strongly predictive of early dropout. This finding supports the hypothesis that there is a relationship between stress and retention in TC treatment, and provides strong support for the early introduction of an adjunctive therapy to manage stress. A recent study of the relationship between baseline subjective stress and outcomes of an 18 month drug court program also found that greater stress was associated with poorer employment, substance use, criminal justice, and health outcomes (18).

Females, though relatively smaller in number in this study, demonstrated higher scores on behavioral measures of stress, consistent with findings of gender-related divergence in the stress response in the literature (19, 20). This finding suggests the need for further study of stress in female substance users and the potential benefit of tailoring gender-specific stress reduction strategies for this population.

Level of participation in MBTC was significantly related to retention. This is consistent with the broader psychotherapy research literature in showing a positive therapy “dose” response curve (21, 22). The variation in MBTC participation could explain why there was no difference in dropout between the intervention and control groups even though there was a “dose” relationship to dropout overall.

Limitations of the present study include difficulty in measuring compliance with mindfulness meditation techniques outside of class time and competing demands of routine treatment limiting time allocated to use of practice facilities. It is important to note, however, that meditation is self-administered and self-practiced, so adherence/compliance may only be a proxy for motivation and not necessarily indicative of the quality of the meditative state (23). For this reason, adopting the traditional pharmaceutical approach in meditative research may be misleading and should be accompanied by qualitative assessments to better understand quality or mastery of meditation (23).

A second limitation is the fact that the MBTC classes may have been perceived by TC staff as separate from the TC curriculum and not necessarily one of the “tools” to be learned to cope with TC treatment and the life beyond. Finally, the quasi-experimental nature of the study precludes attributing causation to the changes noted following MBTC participation. Randomization, while not practical in this study setting, may be possible across facilities in future studies of MBTC treatment. Despite these limitations, the current study provides support for further research on MBTC as an adjunctive therapy to TC treatment.

## ACKNOWLEDGEMENTS

This study was supported by National Institute on Drug Abuse grant DA RO1 DA017719 to Dr. Marianne T. Marcus. The authors are grateful to the administration, staff, and clients of the Houston facility of Cenikor Foundation for their participation. They also thank the dedicated MBSR instructors, Michele Fine, Linda Safranek, Susan Wolfe, and Patricia Palmer, without whose commitment and assistance the study would not have been possible.

## Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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