

# Yoga-Based Classes for Veterans With Severe Mental Illness: Development, Dissemination, and Assessment

Matthew R. Baker; Jillian M. Tessier; Hilary B. Meyer; Alexander C. Sones;  
Neena Sachinvala, MD; and Donna Ames, MD

Throughout 8 weeks of yoga-based wellness classes, veterans were assessed for perceived benefits, pain, stress, and biological, psychological, social, and spiritual wellness.

**T**here is growing interest in developing a holistic and integrative approach for the treatment of severe mental illnesses (SMI), such as schizophrenia, major depression, posttraumatic stress disorder (PTSD), and anxiety disorders. Western medicine has traditionally focused on the direct treatment of symptoms and separated the management of physical and mental health, but increasing attention is being given to complementary and alternative medicine (CAM) for patients with SMI.

Recognizing the connectedness of the mind and body, these complementary or alternative approaches incorporate nontraditional therapeutic techniques with mainstream treatment methods, including psychopharmacology and psychotherapy.<sup>1</sup> Patients with SMI may particularly benefit from a mind-body therapeutic approach, because

they often experience psychological symptoms such as stress, anxiety, depression and psychosis, as well as a preponderance of medical comorbidities, including obesity, diabetes mellitus, and cardiovascular disease, some of which are compounded by adverse effects (AEs) of essential pharmacologic treatments.<sup>2-4</sup> Mind-body interventions might also be particularly advantageous for veterans, who often experience a range of interconnected physical and psychological difficulties due to trauma exposure and challenges transitioning from military to civilian life.<sup>5</sup>

In 2002, the White House Commission on Complementary and Alternative Medicine Policy issued a report supporting CAM research and integration into existing medical systems.<sup>6</sup> The DoD later established Total Force Fitness, a holistic health care program for active-duty military personnel.<sup>7</sup> The VA has also incorporated mind-body and holistic strategies into veteran care.<sup>8</sup> One such mind-body intervention, yoga, is becoming increasingly popular within the health care field.

Recent research has documented the effectiveness of yoga, underscoring its utility as a mind-body therapeutic approach. Yoga is associated with improvement in balance and flexibility,<sup>9</sup> fatigue,<sup>10</sup> blood pressure,<sup>11</sup> sleep,<sup>12</sup> strength,<sup>13</sup> and pain<sup>14</sup> in both healthy individuals and patients with medical and psychiatric disorders.<sup>15</sup> The literature also illustrates that yoga has led to significant improvements in stress and psychiatric symptoms in individuals with PTSD, schizophrenia, depression, and anxiety.<sup>16-22</sup> A previous meta-analysis conducted by the authors, which considered studies of the effectiveness of yoga as an adjunctive treatment for patients with mental illness, found that 212 studies with null results would need to be located and incorporated to negate the positive effects of yoga found in the literature.<sup>17</sup>

Because yoga emphasizes the practice of mindfulness and timing movement with breath awareness, it is a calming practice that may decrease stress and relieve psychiatric symptoms not treated through psychopharmacology and

**Mr. Baker, Ms. Tessier, Ms. Meyer, and Mr. Sones** are research assistants in the research department, and **Dr. Sachinvala** and **Dr. Ames** are psychiatrists in the psychiatry department, all at the VA Greater Los Angeles Healthcare System in California.

**Table 1. Demographic Information at Baseline (n = 120)**

Variable	Mean (SD)
Age, y	61.8 (8.3)
<b>Sex</b>	<b>No. (%)</b>
Male	109 (90.8)
Female	8 (6.7)
Unreported	3 (2.5)
<b>Race/Ethnicity</b>	<b>No. (%)</b>
White	47 (39.2)
African American	32 (26.7)
Hispanic, Latino, or Spanish origin	19 (15.8)
Asian or Pacific Islander	6 (5.0)
Native American or Alaska Native	3 (2.5)
Other	8 (6.7)
Unreported	5 (4.2)

psychotherapy.<sup>17,21</sup> Recent research has postulated that the physiological mechanisms by which this occurs may include (a) reduction in sympathetic and increase in parasympathetic activity<sup>23,24</sup>; (b) increases in heart-rate variability and respiratory sinus arrhythmia, low levels of which are associated with anxiety, panic disorder, and depression<sup>23,24</sup>; (c) increases in melatonin and serotonin<sup>25-27</sup>; and (d) decrease in cortisol.<sup>28,29</sup>

As yoga may calm the autonomic nervous system and reduce stress, it may benefit patients with SMI, whose symptoms are often aggravated by stress.<sup>30</sup> In addition, veterans experience both acute stressors and high levels of chronic stress.<sup>5</sup> Therefore, because they experience mind-body

comorbid illnesses as well as high levels of stress, the authors believe that veterans with SMI could benefit greatly from a tailored yoga-based program as part of a holistic approach that includes necessary medication and evidence-based therapies.

In order to evaluate the effects of a yoga program on veterans receiving mental health treatment across the VA Greater Los Angeles Healthcare System (VAGLAHS), the authors developed a set of yoga-based wellness classes called Breathing, Stretching, Relaxation (BSR) classes. This article describes the process of developing these classes and outlines the procedures and results of a study to assess their effects.

### BSR CLASSES

The development of BSR classes took place at the West Los Angeles VA Medical Center (WLAVAMC), within the Psychosocial Rehabilitation and Recovery Center (PRRC) program. The PRRC is a psychoeducational program that focuses on the biological, psychological, social, and spiritual aspects of life in order to help veterans with SMI rehabilitate and reintegrate into the community. The program allows veterans to create their own recovery curriculum by selecting from diverse classes led by program staff members, including physicians, psychologists, nurses, social workers, nutritionists, and recreational therapists.

### Development of BSR Protocols

The primary goal of this project was to develop a yoga-based program tailored to the specific needs of veterans with SMI. To the authors' knowledge, BSR is the first yoga-based program customized for SMI. The BSR classes were developed within interdisciplinary focus groups that included professional yoga teachers, the director

of the PRRC, psychiatrists, psychologists, nurses, occupational therapists, and physical therapists. Drawing on their experience with SMI and yoga, members of the focus groups identified 3 aspects of yoga that would be most beneficial to veterans with SMI, and the program was designed to optimize these effects. Because SMI can both create and be exacerbated by stress, BSR classes were designed to reduce stress and provide veterans with the tools to monitor and manage their stress.

Breathing and meditative techniques were adapted from yoga in order to facilitate stress reduction. In addition, aerobic elements of yoga have the potential to help veterans manage their incidence of medical diseases, such as cardiovascular disease, obesity, and diabetes. Patients with SMI are at a greater risk for developing these diseases, so classes were designed to incorporate physical stretching elements to promote overall health.<sup>4,31-33</sup> Finally BSR was designed to improve veteran self-efficacy and self-esteem, and to place veterans at the center of their care by equipping them with skills to practice BSR independently.

The focus groups also identified the logistic requirements when implementing a yoga-based program for veterans with SMI, including (a) obtaining participant or conservator consent; (b) obtaining medical clearance from care providers, given the high prevalence of medical comorbidities; (c) removing the traditional yoga terms, taking a secular approach, and naming the class "Breathing, Stretching, Relaxation" without directly referencing yoga; (d) asking veterans' permission before incorporating physical contact into demonstrations, because veterans with SMI, especially those with PTSD, might be uncomfortable with

touching from instructors; (e) creating protocols of varying duration and intensity so that BSR was approachable for veterans with diverse levels of physical ability; and (f) ensuring that a clinician who regularly works with SMI patients be present to supervise classes for the safety of patients and instructors.

Yoga instructors and clinicians collaborated to create adaptable 30- and 50-minute protocols that reflected best practices for an SMI population. The 30-minute seated BSR class protocol is included in eAppendix A (available at [www.fedprac.com](http://www.fedprac.com)). Once protocols were finalized, a Train the Trainer program was established to facilitate dissemination of BSR to clinicians working with veterans with SMI throughout the VAGLAHS.

Interested clinicians were given protocols and trained to lead BSR classes on their own. Subsequently, clinician-led BSR classes of various lengths (depending on clinician preference and program scheduling) were established at PRRCs and other mental health programs, such as Mental Health Recovery and Intensive Treatment and Dual Diagnosis Treatment Program, throughout the VAGLAHS. These programs were selected, because they are centered on recovery and improvements in symptoms of SMI. The adoption of a Train the Trainer model, through which VA clinicians were trained by professional yoga instructors, allowed for seamless integration of BSR into VA usual care for veterans with SMI.

## ASSESSMENT OF CLASSES

The authors conducted a study to assess the quality and effectiveness of BSR classes. This survey research was approved by the VAGLAHS institutional review board for human subjects. The authors hypothesized that there would be sig-

**Table 2. Veterans Attending Classes (n = 120)**

Class Duration (min)	Veterans, No.
Short classes (10-29)	74
Medium classes (30-59)	27
Long classes (60+)	19

nificant improvements in veterans' stress, pain, well-being, and perception of the benefits of BSR over 8 weeks of participation in classes. Also hypothesized was that there would be greater benefits in veterans who participated in longer classes and who attended classes more frequently.

## Methods

A total of 120 veterans completed surveys after participating in clinician- and yoga instructor-led BSR classes at the 3 sites within the VAGLAHS: WLAVAMC, Los Angeles Ambulatory Care Center (LAACC), and Sepulveda Ambulatory Care Center (SACC). At the WLAVAMC, surveys were collected at 10-, 30-, 60-, and 90-minute classes. At LAACC, surveys were collected at 30- and 60-minute classes. At SACC, surveys were collected at 20- and 45-minute classes. A researcher noted the duration of the class and was available to assist with comprehension. Veterans completed identical surveys after classes at a designated week 0 (baseline), week 4, and week 8. Of the 120 patients with an initial survey, 82 completed at least 1 follow-up survey and 49 completed both follow-up surveys.

Survey packets included (a) demographic questions, including age, gender, and ethnicity; (b) class participation questions, including frequency of class attendance, patients' favorite aspect of class, and duration of class attendance (in months

**Table 3. Self-Reported Prior Experience With Yoga (n = 119)**

Prior Experience, Mo	Veterans, No.
< 1	35
1	9
2	19
3	7
4	11
≥ 5	38

of prior participation); (c) a pain rating from 0 (no pain) to 10 (the worst pain imaginable); (d) the BioPsycho-Social-Spiritual (BPSS) Scale (see eAppendix B, available at [www.fedprac.com](http://www.fedprac.com)), developed at the WLAVAMC, which provides wellness scores from 0 (low) to 10 (high) in 4 areas as well as a holistic wellness score from 0 (low) to 40 (high); (e) the Perceived Stress Scale (PSS), developed by Cohen and colleagues, which generates a stress score for the past month from 0 (low) to 40 (high)<sup>34</sup>; and (f) the Perceived Benefits of Yoga Questionnaire (PBYQ) (see eAppendix C, available at [www.fedprac.com](http://www.fedprac.com)), which rates participants' opinions about the benefits of yoga from 12 (low) to 60 (high) and is based on the Perceived Benefits of Dance Questionnaire.<sup>35</sup>

## Statistical Analysis

Pearson's *r* correlation coefficients were calculated between PBYQ scores and quantitative survey items at each time point (weeks 0, 4, and 8). Linear mixed-effects models were used to test for effects of multiple predictor variables on individual outcomes. Each model had a random intercept by participant, and regressors included main effects for the following: survey week (0, 4, or 8),

**Table 4. Correlations Between PBYQ and Class Duration, Age, Pain, PSS, and BPSS at Baseline, Week 4, and Week 8**

PBYQ	Class Duration	Age	Pain	PSS	BPSS – Biological	BPSS – Psychological	BPSS – Social	BPSS – Spiritual	BPSS – Total
Baseline	.41 <sup>a</sup> (n = 110)	-.20 <sup>b</sup> (n = 105)	-.36 <sup>a</sup> (n = 108)	-.31 <sup>c</sup> (n = 105)	.38 <sup>a</sup> (n = 107)	.43 <sup>a</sup> (n = 107)	.41 <sup>a</sup> (n = 107)	.34 <sup>a</sup> (n = 107)	.50 <sup>a</sup> (n = 107)
Week 4	.45 <sup>a</sup> (n = 63)	-.30 <sup>b</sup> (n = 62)	-.43 <sup>a</sup> (n = 63)	-.57 <sup>a</sup> (n = 61)	.26 <sup>b</sup> (n = 62)	.36 <sup>c</sup> (n = 62)	.33 <sup>c</sup> (n = 61)	.40 <sup>c</sup> (n = 61)	.44 <sup>a</sup> (n = 61)
Week 8	.41 <sup>a</sup> (n = 64)	-.31 <sup>b</sup> (n = 62)	-.41 <sup>a</sup> (n = 63)	-.44 <sup>a</sup> (n = 63)	.38 <sup>c</sup> (n = 62)	.34 <sup>c</sup> (n = 62)	.29 <sup>b</sup> (n = 62)	.28 <sup>b</sup> (n = 62)	.37 <sup>a</sup> (n = 62)

Abbreviations: BPSS, BioPsychoSocial-Spiritual Scale; PBYQ, Perceived Benefits of Yoga Questionnaire; PSS, Perceived Stress Scale.  
<sup>a</sup>*P* < .001.  
<sup>b</sup>*P* < .05.  
<sup>c</sup>*P* < .01.

class duration (in minutes), age, sex, ethnicity, frequency of attendance (in days per week), and duration of attendance (in months). For all statistical analyses, a 2-tailed significance criterion of  $\alpha = .05$  was used.

**Results**

Veterans who completed surveys were predominantly male (90.8%) and averaged 61.4 years of age. Table 1 shows demographic information. Table 2 displays the number of participants who were involved in short (< 30 min), medium (30-59 min), and long (> 60 min) classes. Veteran participants also had a wide range of prior BSR experience (Table 3).

At all time points, PBYQ scores were significantly positively correlated with class duration and biological, psychological, social, spiritual, and total well-being as measured by the BPSS. The PBYQ scores at all time points were also significantly negatively correlated with age, pain ratings, and PSS scores. Table 4 includes specific Pearson’s *r* values.

Survey week was not significantly associated with any individual outcome measures. There were no significant regressors for total PSS score or total BPSS score within the linear

models. However, participants’ PBYQ scores were significantly associated with age ( $t(98) = -2.13, P = .036$ ), frequency of attendance ( $t(103) = 2.10, P = .038$ ), and class duration ( $t(98) = 4.35, P < .001$ ). Additionally, class duration was significantly associated with pain ( $t(98) = -3.01, P = .003$ ), with longer duration associated with less pain. Ethnicity was also associated with pain, with African American veterans reporting less pain than did white ( $t(98) = -2.41, P = .017$ ) and Hispanic ( $t(98) = -2.31, P = .023$ ) veterans. Because ethnicity was significantly associated with class duration ( $F(5,339) = 3.81, P = .002$ ), the authors used an analysis of covariance to test for a mediating effect of ethnicity on the relationship between class duration and pain. Although there was a partial mediation ( $F(5,203) = 2.57, P = .028$ ), the main effect of class duration remained significant.

**DISCUSSION AND LIMITATIONS**

The goals of this project were to develop a yoga-based program tailored for veterans with SMI and assess the program in a sample of veterans with SMI on subjective reports of stress, pain, well-being, and benefits of

yoga. The authors hypothesized that significant improvements in these measures in veterans with SMI would be observed over 8 weeks of participation in BSR classes and that there would be greater benefits in veterans who participated in longer classes and who attended classes more frequently.

The authors succeeded in developing an adaptable yoga-based wellness program for veterans with SMI that can be both practiced in structured classes and incorporated into veterans’ everyday routines. The BSR classes were well tolerated by veterans with SMI, caused no discernible AEs, and are readily available for dissemination across other mental health programs. Veterans described integrating the tools they learned within BSR classes into their daily lives, helping them to manage pain; feel more flexible; reduce stress, anxiety, depression, and PTSD symptoms; and increase relaxation and feelings of self-control and confidence. Table 5 shows qualitative feedback collected from veterans. In addition, the Train the Trainer model optimized clinical applicability and flexibility, demonstrating that clinicians can seamlessly integrate BSR

**Table 5. Qualitative Feedback About BSR Classes****Sepulveda Ambulatory Care Center Feedback**

“Relaxes the body and mind. Make one aware of oneself. Keeps mind concentrated and make one aware of things around us.”

“I feel more relaxed when I’m taking this class. Stretching helps with the different pains that I have.”

“This has helped in my everyday life and also has affected my ability to deal with my stress and dealing with “PTSD” and panic attacks that I get from time to time. It also helps me to relax and forget about things are not so bad as I felt they were.”

“The BSR class improve [sic] self-control.”

**West Los Angeles VAMC Feedback**

“It has definitely worked for me. I always leave the class feeling less stressed than going into it. It helps me to stay grounded when I feel like the world is closing in on me. It definitely gives me hope for the future that one day I can practice yoga on a higher level. And it can take up where the medication leaves off in helping me gain control of my stress, anxiety, depression, and PTSD.”

“Yoga teaches me how to survive and thrive at peace in my home with my son. I left the Marines with injuries some apparent some not. Yoga helps me to heal those invisible injuries in my mind and the unseen injuries in my body. Some of my injuries are in my neck and back from having too much stress for too long. Yoga teaches me to breath [sic] and let go of the stress in my neck and back. Thank you for yoga.”

“Tremidously [sic], huge, dramatically it is hard to describe, because it affects me inwardly, mentally spiritually and physically of course. Leaves me relaxed calm, confident and more.”

“My ability to relax has improved a hundred fold. I have improved flexation [sic] and control of my body. Areas of my body that have problems are easily identified and compensated for. It has been a very helpful class to attend and I look forward to it every week. The classes have improved my daily outlook and relieved some of my physical ailments.”

Abbreviations: BSR, breathing, stretching, relaxation; PTSD, posttraumatic stress disorder.

classes into a health care plan for veterans with SMI.

In assessing quantitative measures of stress, pain, well-being, and perceived benefits of a yoga-based program, veterans who reported BSR classes as beneficial experienced lower levels of pain and stress and higher levels of biological, psychological, social, spiritual, and overall well-being. Those veterans who perceived BSR as more beneficial tended to be younger and attend longer classes with greater frequency. Veterans who attended longer classes also reported experiencing less pain. This may be because the more rigorous stretching and posing involved in longer BSR classes made them more effective at reducing pain; however, it is also possible that veterans who were experiencing more pain avoided these longer classes due to their rigor and length.

Results suggest that longer classes

attended with greater regularity may be more beneficial to veterans than short and infrequent classes, particularly in regards to their pain. Despite the relationships between class and outcome variables, the authors did not find significant improvements in measures of wellness, pain, stress, or perceived benefits of BSR over time, as was hypothesized. This may be because the data collection for this study began after classes had been established for some time. In fact, only 35 of 120 veterans included in this study reported having < 1 month of BSR experience at week 0, suggesting that results collected from week 0 did not represent a true baseline measurement. Although no relationship was found between prior duration of attendance and any outcome measures, the fact that most veterans in the sample had attended classes for several months prior to completing surveys may have biased the results

by favoring the responses of veterans who were more invested in the classes. Improvements may have been better captured in a BSR-naïve sample.

The finding that the PBYQ score was significantly correlated with all other outcome measures (pain, BPSS score, and PSS score) raises some questions about the ways in which these classes were beneficial to veterans. It may be that veterans who experienced more positive outcomes from classes saw BSR as more beneficial, but it is also possible that veterans who entered classes with greater expectations experienced better outcomes due to a placebo effect—that is, outcomes may have been influenced more by the expectation than by the content of the classes. In the case of well-being (BPSS scores) and stress (PSS score), this could explain why these outcomes were significantly correlated with perceived

benefits of BSR but were not significantly related to any class-related variables such as duration and frequency of attendance. Pain ratings, however, were related to class variables and perceived benefits of BSR.

In a post hoc analysis, the main effect of the PBYQ score as a regressor was added to the linear model for pain, resulting in the PBYQ score having a significant main effect ( $t(100) = -2.98, P = .004$ ). The main effect of class duration remained significant ( $t(97) = -1.99, P = .050$ ) but was less substantial when the PBYQ score was added, suggesting some correlation between class duration and pain, independent of BSR's perceived benefits. Future research should consider the possible mediating effect of perceptions of the effectiveness of a yoga-based program a priori or control for placebo effects in order to address the degree to which outcomes are influenced by participant expectations.

This study had a few other notable limitations. Because it was an observational study administered within a clinical mental health program, a control group was not included. Measurement began after BSR classes were established, so veterans had varying levels of prior experience. Specific SMI and medical diagnosis information was not collected from individual veterans. Data were collected from classes of varying length and intensity. The BSR classes often took place within larger programs at the VA, which offered comprehensive care, so some effects of the BSR classes might have been confounded with concurrent evidenced-based treatments or other holistic care programs. Due to these limitations, particularly the absence of a control group, the relationships between BSR participation and health outcomes cannot be assumed to be causal, because a multitude of other variables, such as

patient contact and expectancy effects, may have influenced outcomes.

### Future Directions

Future research should aim to utilize a control group and collect data from classes of the same intensity and length to better examine whether BSR can be causally linked with improvements in measures of stress, pain, and well-being and to attempt to control for expectancy and contact effects. In addition, future research should aim to recruit a BSR-naïve sample to account for prior experience. Future studies should also aim to parse out whether BSR is differentially effective for each SMI or medical diagnosis, whether there is a relationship between class time and outcomes (as these results suggest that longer class times might be more beneficial for pain), and whether any pain-management benefits from BSR influence other measures of functionality and well-being. Finally, future research can further divide BSR into its active components, such as meditative breathing and aerobic stretching, in order to examine which aspect leads to the greatest effect on each measure; the current results imply that the more rigorous components of BSR classes have the greatest effects on pain.

### CONCLUSION

A yoga-based class affects the mind and body, making it particularly useful for veterans with SMI who experience a range of physical and psychological symptoms and comorbidities.<sup>4</sup> Other studies have demonstrated that when practiced alone, yoga leads to improvements in both physical and psychological symptoms.<sup>15,17</sup> Looking forward, yoga-based classes may be implemented as part of a larger biopsychosocial-spiritual care plan that is being em-

braced both within and outside of the VA.<sup>7,8,36,37</sup> This integrative health care model suggests that psychosocial and CAM modalities are additive and should be practiced concurrently.<sup>37</sup>

Although little research has assessed the effects of comprehensive psychosocial and CAM treatment programs, initial research indicates that these programs are associated with reductions in symptoms of medical and mental illness.<sup>37-40</sup> Participants in BSR classes may derive further benefits if classes are incorporated into a larger holistic health care plan that includes both traditional psychiatric treatment modalities and CAM therapies that integrate biopsychosocial-spiritual components. ●

### Acknowledgements

*The authors would like to thank Nancy Mohler, Anne Platt, and Matthew Crowder, all professional yoga instructors, for their integral role in developing classes, providing classes to veterans, and assisting VA staff with training. The authors also acknowledge Rosie Dominguez, LCSW, for expertly leading BSR classes at LAACC. The authors also thank Irina Arnold, MS, MD, and Vanessa Streiff, MA, for their vital assistance with data collection at SACC.*

*Funding for the development of BSR protocols, quality improvement research, and expenses associated with classes was provided by the Disabled American Veterans Charitable Service Trust. Support for dissemination of classes to multiple VA programs was provided by a grant from the VA Center of Innovation for Patient Centered Care, headed by Sandra Robertson, RN, MSN, PH-CNS.*

*The authors are very grateful to the veterans and staff of the Mental Health Intensive Case Management, Psychosocial Rehabilitation and Recovery Centers, Mental Health Clinics, and Domiciliary*

throughout Greater Los Angeles for their support of the BSR classes.

### Author disclosures

The authors report no actual or potential conflicts of interest with regard to this article.

### Disclaimer

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