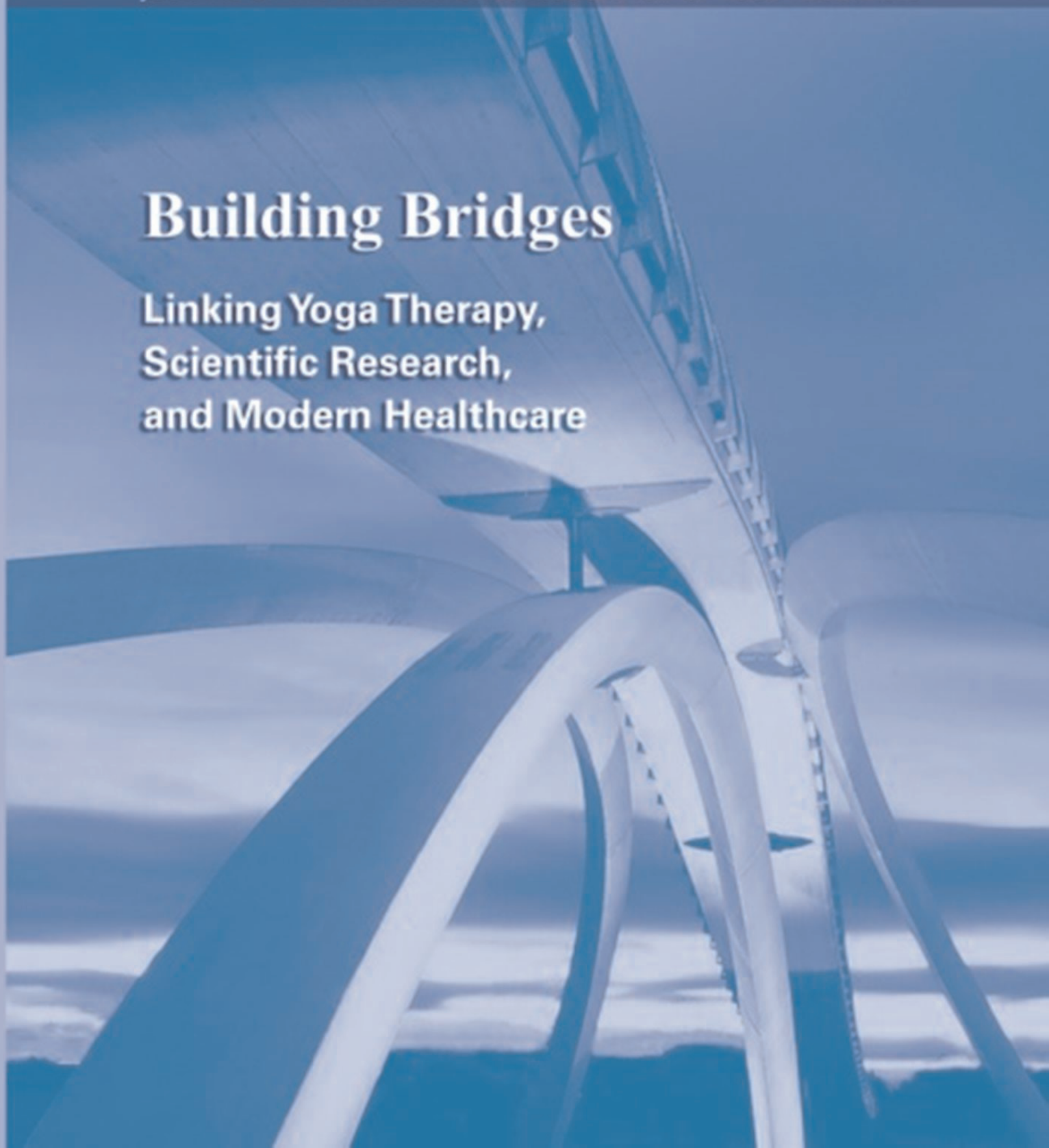


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Editorial

Crossing the Divide: Realizing the Power of Partnership

B. Grace Marie Bullock, PhD, E-RYT 200, RYT-500

Editor in Chief



For years I have worn a leather band on my wrist that reads, “Be the Change.” It is a constant reminder to embody the change I want to see in the world by engaging in service and collaborative partnership and approaching each person and task with compassion, loving kindness, and equanimity. When I received the honor of becoming the new editor in

chief of the *International Journal of Yoga Therapy*, I was compelled to examine how to transform this personal intention into practice for the good of the yoga community.

As I stand on the precipice gazing out at the remarkable legacy of my predecessor, Kelly McGonigal, and the vast accomplishments of the IAYT leaders and community, I can clearly see that the field of yoga therapy is poised to change healthcare service delivery in ways that we could only dream of a decade ago. Yoga therapists, teachers, researchers, healthcare practitioners, and students have experienced the power of the practice, yet as a field we have yet to fully realize the potential of partnership.

This issue is dedicated to building bridges, to examining the beliefs that limit our ability to construct meaningful relationships between yoga, scientific research, and modern healthcare, and to finding common ground. While cultivating interconnectedness, we lay the foundation for bridges that span disciplines, traditions, and belief systems. The Perspectives in this issue provide philosophical views and practical examples of how to accomplish this task at multiple levels, ranging from deepening our personal practice to working with major insurance companies.

There are many bridges to construct and countless opportunities for each of us to participate. Perhaps the most important task in this effort involves communication, with yoga professionals making a concerted effort to learn the language of science and modern healthcare, and vice versa. Michelle Walsh and Kusnick, Kraftsow, and Hilliker offer two exceptional examples of the power of partnership and successful collaborations that built on shared vision and communication strategies and translated yoga traditions into pragmatic concepts for researchers, healthcare professionals, and administrators.

Consider examining ways in which you can uniquely contribute to this evolution. What skills can you offer, and where can you realize personal and professional growth? Do you have ideological biases that prevent you from cultivating relationships with those whose skills and expertise are different from yours? If you have ever tried standing relaxed with your eyes closed and your feet rooted into the ground, you will observe that your body engages in continuous micro-movement to allow for the dynamic shifts of the earth. If you stand rigidly, you will inevitably fall over. If we remain entrenched in our personal or professional dogma, we miss the rich opportunity to move in synchrony with those who are dedicated to serving others.

As you observe the personal and professional vistas before you, I encourage you to open yourself to the groundbreaking possibilities of partnership and to seek opportunities to build bridges in your practice, therapeutic work, research program, or wherever you see the potential for moving beyond your comfort zone. I hope the articles in this issue inspire you to be the change you want to see in the world.

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Research

Perspective

Bridging Yoga Therapy and Scientific Research

Marshall Hagins PT, PhD,¹ Sat Bir S. Khalsa, PhD²

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2. Assistant Professor of Medicine, Harvard Medical School

If you are a practicing yoga therapist or someone who has benefited from yoga therapy, you probably have little need for scientific research to validate your personal experience. However, you are also part of a rather elite group. The practice of yoga is largely dominated by Whites, women, those with higher education and incomes, and young and middle-aged adults who represent a very narrow segment of the population.¹ The most compelling rationale for research on yoga therapy is to provide the evidence base required for its incorporation into our education and healthcare systems, thereby disseminating it more widely and equitably across the population.² Scientific validation will boost the credibility of yoga therapy as a safe and cost-effective intervention. The time has come to construct a collaborative bridge between yoga therapy and scientific research.

There is a low rumble of discontent among some in the yoga therapy community regarding the emerging link between science and yoga. Some are unsatisfied with the current research strategies, and others have implied that yoga is beyond conventional scientific study in that “yoga practice operates outside of the rules of linearity and causality.”³ Although there may be aspects of yoga that cannot currently be assessed, science can inform what can be measured.^{3,4} The complex, multimodal, dynamic interactions between therapists and clients are not unique to yoga therapy. There is a long tradition of rigorous and successful scientific study of complex behavioral processes in other fields (e.g. nursing, psychology). Although studying interpersonal dynamics can be challenging, it is far from impossible.

The engineering of the bridge itself is critical—what is the best way for science to study yoga? What do we want this bridge between science and yoga to accomplish? If the purpose is to alter perceptions and behavior, it will need to

be sturdy. This means that we need a compendium of empirically rigorous research to scaffold the process. There is some debate in the yoga therapy community about what constitutes a “high quality” study.^{2,4} The gold standard for intervention research and the primary target for criticism has been the randomized controlled trial (RCT). RCTs randomly assign participants to either a standardized yoga intervention or a control condition (e.g., exercise, or treatment as usual). Randomization is intended to mitigate initial differences between groups that might limit the ability to attribute posttreatment group effects to factors related to the intervention.

In addition to the use of RCT designs, the standardization of yoga practices has been hotly debated. Standardized interventions allow for the systematic application, replication, and analysis of a therapeutic protocol. They also allow for the statistical evaluation of factors in the intervention that may be directly associated with change for the individuals who received treatment.

A key limitation of this approach is that if not carefully measured, the dynamic and complex therapist–client interactions that are unique to each individual are not accounted for. As such, the use of a standardized intervention may underestimate or fail to account for this potential benefit of yoga. Although this is a legitimate concern, it is possible to construct standardized yoga protocols that afford the therapist a selection of practices and modifications based on client needs. As long as the choices and the decision making of the teacher are explicit, the scientific integrity of the intervention is not compromised. In fact, advanced strategies for measuring and statistically analyzing individually tailored therapies have been in practice for decades in the social sciences. That said, the RCT provides

a viable and empirically rigorous option for testing the effectiveness of yoga interventions and evaluating the subtleties of the therapeutic process.

Case studies, observational research, single subject multiple baseline designs, qualitative investigations, and other strategies have been suggested as complements or even replacements for the RCT. These strategies are well established in biomedical research and can provide unique and important information, including measures of effect size and long-term outcomes, as well as hypotheses regarding the underlying and interacting mechanisms of action. These designs are typically less expensive and complex and easier to perform. Unfortunately, these strategies prohibit our ability to ascertain whether the yoga intervention is directly associated with therapeutic change, because potential biases are not systematically and statistically controlled for. Nevertheless, these types of research add to the rich tapestry of information in that they provide clues and insights that can inform the design and execution of subsequent studies and RCTs.

The characteristics of yoga researchers and the implications of funding constraints on the nature and quality of research conducted merit consideration. The vast majority of yoga researchers are scientist-yogis with a personal practice, and many have been profoundly influenced by yoga. Their experience has inspired them to undertake scientific research on yoga's benefits, not to dismantle or discredit the practice.

Acquisition of funding strongly drives decisions about study design. Yoga research grants from the National Institutes of Health (NIH) are extraordinarily difficult to come by because competition is fierce. In this environment, yoga researchers will succeed primarily with scientifically rigorous study designs and the evaluation of outcomes critical to public health. It is unusual to find exclusively observational or qualitative studies being funded by NIH.

The primary NIH funding source for yoga research is the National Center for Complementary and Alternative Medicine (NCCAM) of NIH, whose grant proposal review panels include scientists with yoga expertise. NCCAM reviews only smaller training and pilot study grants and not major, large-scale research proposals. Consequently, applications involving yoga research may be evaluated by a panel of experts with little or no knowledge of the subtleties of yoga therapy. This may result in a lack of appreciation for yoga research in general, but also in a bias favoring proposals with conventional research designs, such as RCTs. The practical reality for yogi-scientists is that they live in a highly competitive world in which only a select number of very empirically rigorous studies are likely to be funded.

The bridge connecting science and yoga therapy is under construction. What has been accomplished so far has resulted from the efforts of yoga research scientists and those of editors and thought leaders, such as IAYT board members and CEO John Kepner, who have promoted the value of yoga research and the science of yoga across multiple platforms, including at research conferences and during yoga therapy training. With the continued efforts of the yoga therapy research community, the perceptions and ultimately the behaviors of individuals and institutions in our society will benefit from the increased implementation of yoga and yoga therapy.

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Research

Perspective

Yoga Therapy and the Group Effect: Bridging Individual and Group-Level Research

Esther Wyss-Flamm, PhD, RYT

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While reviewing the growing body of research regarding the therapeutic outcomes of yoga interventions, I am struck by an interesting disconnect. The studies generated in our field typically examine the effects of a yoga treatment at the individual level and ignore potential group influences. Whether by choice or for reasons of economy, the majority of yoga classes take place in a group setting. It is time to build a bridge between individual and group-level yoga therapy research.

Typical research protocols measure individual-level responses to treatment. Research scientists attempt to create realistic contexts with high face validity in which individual change can be directly attributable to the yoga intervention. Research models use designs that were developed for medical research to enhance methodological and statistical rigor, with the intention of generating scientifically credible results and opportunities for additional funding.

When this approach is used, the role of fellow yoga class participants and the interpersonal process dynamics that occur within the group are typically not measured or considered. By ignoring the group context, we run the risk of failing to account for the importance of these valuable interpersonal dynamics as they relate to treatment outcomes. Indeed, group factors could play a potentially powerful role in facilitating or undermining the healing process.

Our current understanding of group effects is primarily tacit and based on the anecdotal accounts of yoga practitioners. Group influences on yoga therapy outcomes may be relevant to the therapeutic process on several levels:

The group can promote buy-in among peers. Although some level of internal motivation is essential, external factors often play an important role in an individual's decision

to attempt and continue a yoga practice. A large compendium of research has addressed peer group influences across most ages and developmental stages. Collectively, these findings speak to the importance of group processes in adopting and maintaining health-promoting behaviors and to the facilitative influence of group culture. Members in a group can do a great deal to enhance the desirability of participating in a yoga class.

The group can offer a context of safety and social support. The group culture inherent in yoga classes is well suited to dealing with pain, isolation, and alienation that many individuals encounter when coping with a health crisis. This may be particularly relevant for persons with depression or those coping with a life-threatening diagnosis. A well-facilitated group can provide a safe haven for self-exploration and an important source of social support for those coping with similar health concerns.

The group can offer a model for holistic healing. Yoga is a holistic practice in which the many layers of the self (physical, energetic, emotional, intellectual, and spiritual) are considered as part of the healing process. In a group context, participants can explore these facets of self and self-other interconnectedness as they practice alongside each other. In observing physical, energetic, and emotional similarities and differences with others, members can cultivate not only a stronger relationship to the self, but an appreciation of their connectedness to the group, community, and higher levels of consciousness.

Yoga researchers run the risk of failing to understand or account for important influences relative to intervention outcomes when not considering the group context. A lack of attention to group processes attenuates our ability to har-

ness the richness of group dynamics that may contribute to positive outcomes. Conversely, it is important to examine aspects of group functioning that may compromise the effectiveness of a well-conceived yoga program. Other disciplines have identified a number of group dynamics, such as contagion of negative behaviors, that can undermine treatment effects. It is important for yoga teachers and therapists to hone their awareness of when and how interpersonal processes operate within groups. Yoga therapy researchers would do well to follow the example of social systems and dynamic systems researchers and use assessment strategies and statistical techniques to examine group process variables and effects. Developing our understanding of the power of group process will help identify cost-effective modalities of intervention delivery that maintain the holistic integrity of the yoga tradition and result in more successful and informed treatment outcomes.

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Research

Psychological Well-Being, Health Behaviors, and Weight Loss Among Participants in a Residential, Kripalu Yoga-Based Weight Loss Program

Tosca D. Braun, BA,¹ Crystal L. Park, PhD,²

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Abstract

Objectives: The increasing prevalence of overweight and obesity in humans is a growing public health concern in the United States. Concomitants include poor health behaviors and reduced psychological well-being. Preliminary evidence suggests yoga and treatment paradigms incorporating mindfulness, self-compassion (SC), acceptance, nondieting, and intuitive eating may improve these ancillary correlates, which may promote long-term weight loss. **Methods:** We explored the impact of a 5-day residential weight loss program, which was multifaceted and based on Kripalu yoga, on health behaviors, weight loss, and psychological well-being in overweight/obese individuals. Thirty-seven overweight/obese program participants (age 32–65, BMI>25) completed validated mindfulness, SC, lifestyle behavior, and mood questionnaires at baseline, postprogram, and 3-month follow-up and reported their weight 1 year after program completion. **Results:** Significant improvements in nutrition behaviors, SC, mindfulness, stress management, and spiritual growth were observed immediately postprogram ($n = 31$, 84% retention), with medium to large effect sizes. At 3-month follow-up ($n = 18$, 49% retention), most changes persisted. Physical activity and mood disturbance had improved significantly postprogram but failed to reach significance at 3-month follow-up. Self-report weight loss at 1 year ($n = 19$, 51% retention) was significant. **Conclusion:** These findings suggest a Kripalu yoga-based, residential weight loss program may foster psychological well-being, improved nutrition behaviors, and weight loss. Given the exploratory nature of this investigation, more rigorous work in this area is warranted.

Key Words: yoga, mindfulness, self-compassion, psychological health, overweight, obesity, health behaviors, health behavior change

Introduction

Overweight/obesity is a growing concern. In the United States alone, nearly 70% of the population is overweight (BMI \geq 25) or obese (BMI \geq 30),¹ and that number is projected to increase by nearly 40% by 2030.² Conventional weight management protocols have demonstrated poor long-term efficacy, with most weight lost being regained within 5 years.^{3,4} Aside from the health risks arising directly from excess body weight, obesity has well-documented associations with poor health outcomes, including hypertension, elevated cholesterol, and poor cardiorespiratory fitness,^{5,6} as well as reduced psychological well-being.^{7,8}

Several innovative approaches for the promotion of weight management and related health behaviors have been tested in the past 2 decades. They include yoga, nondieting (Health at Every Size), third-wave cognitive-behavioral therapies, and the related exploration of self-compassion. No programs to date have combined elements of these approaches.

The Integrative Weight Loss (IWL) program is offered once monthly at the Kripalu Center for Yoga and Health and is influenced by Kundalini and Tantra yoga traditions, which have roots in Patanjali's classical yoga. Kripalu yoga emphasizes the cultivation of mindfulness and experiential acceptance, self-compassion, clarification and commitment, spirituality, and intuition to guide yoga on and off the mat.⁹ The goal of this study was to evaluate a 5-day residential weight management program based on Kripalu yoga that integrates components of these methodologies.

The IWL program incorporates curricula from the field of mind-body medicine that are theoretically and pragmatically aligned with the principles of Kripalu yoga. They include lectures about whole-foods nutrition, stress management, and self-care; mindful exercise; a whole-foods cooking class; workshops on mindful/intuitive eating and body image; and share circles. Although the IWL program has not been evaluated as a standalone approach, it integrates several theoretical constructs and therapeutic elements that have shown promise in the attenuation of overweight/obesity, health behavior change, and psychological well-being.

Health At Every Size (Nondieting)

Nondieting approaches have gained traction in the past 20 years, largely because research suggests dieting may not only fail to promote long-lasting weight loss,¹⁰ but may foster psychological distress,^{11,12} binge eating,¹³ and overeating among restraint eaters.^{14,15} Weight cycling ("yo-yo" dieting) may also worsen associated indices of psychological comorbidity¹⁶ and increase risk of early mortality among some populations.¹⁷ The Health at Every Size (HAES) paradigm

contends that health exists at any body size.¹⁸ HAES deemphasizes weight loss as a primary endpoint and endorses cognitive restraint as a focal method of weight management. It emphasizes health behavior change and homeostatic regulation of eating behavior through attunement to endogenous hunger and satiety cues ("intuitive eating") within a framework of size acceptance, self-care, and well-being.¹⁹ Some evidence suggests improved psychological health and long-term reductions in weight following HAES programs may trump outcomes of conventional treatments among relatively homogeneous samples of Caucasian women.^{19,20}

HAES, Kripalu Yoga, and IWL

Kripalu yoga's emphasis on self-acceptance and self-care renders it well matched to the HAES paradigm. The IWL approach shares much with that of HAES in its emphasis on nondieting, intuitive eating, lifestyle change, self-acceptance (e.g., "you are already perfect exactly as you are" is a classic Kripalu mantra), and explicitly integrated social support.

Third-Wave Cognitive-Behavioral Therapies

Third-wave cognitive-behavioral therapies build on traditional behavioral therapies but also emphasize mindfulness, acceptance, cognitive defusion, and spirituality.²¹ As such, *mindfulness* refers to the tendency to be highly aware of one's internal and external experiences in the context of an accepting, nonjudgmental stance toward those experiences.²² *Acceptance* refers to an active willingness to experience emotions, bodily sensations, and thoughts without trying to control or manipulate them.²³ *Cognitive defusion* refers to the state whereby an individual deidentifies with and becomes more discerning of thoughts or feelings.^{23,24} Mindfulness- and acceptance-based approaches are theorized to increase inner wisdom (i.e., awareness arising from implicit/subliminal self-regulatory processing mechanisms, or intuition).²⁵ Kristeller hypothesizes that inner wisdom may play an integral role in the attenuation of dysregulated eating behavior.²⁵

Third-wave approaches that address weight management and health behavior change are primarily mindfulness based (e.g., Mindfulness-Based Eating Awareness Training [MB-EAT], Mindful Eating and Living [MEAL]) and acceptance based (Acceptance and Commitment Therapy [ACT]). Most such approaches complement existing behavioral protocols for obesity treatment (e.g., the LEARN program),²⁴ thus coupling a direct emphasis on weight loss, nutrition, and exercise with the cultivation of acceptance and mindfulness skills and training.

ACT is a comprehensive, theoretical, and therapeutic protocol that aims to foster willingness to experience what cannot be controlled while simultaneously promoting behavior that is consistent with desired goals and values.²⁶ It postulates that the source of goal-discordant behavior (e.g., failure to adhere to diet or exercise guidelines) resides in the avoidance of challenging or uncontrollable emotions or situations (i.e., experiential avoidance).²⁷

ACT uses various methods to help individuals be present with resistance. One technique used by ACT is called *urge surfing*, a mindfulness and cognitive-behavioral technique that teaches participants to “ride” and tolerate eating-related cravings and distress.²⁸ For instance, if a person experiences sweet cravings when on a weight loss plan, his or her attention would be sustained on the craving without it being acted on, and the person would simultaneously accept the discomfort associated with doing so.

Dispositional acceptance and mindfulness have been associated with exercise maintenance,²⁹ and cross-sectional studies suggest mindfulness is associated with positive health behaviors,^{30,31} lower BMI,³² lower waist-hip circumference, less external and emotional eating, fewer perceived barriers to physical activity,³³ and psychological health.³⁴ Mindfulness training has been found to promote weight loss,³⁵⁻³⁷ reduce external eating, and promote mindfulness³⁸ among the overweight and obese; improve mood³⁴ and health behaviors;³⁹ and foster increased self-compassion.⁴⁰ ACT studies have shown preliminary support for improving BMI, psychological distress, and eating behavior.^{24,26,41}

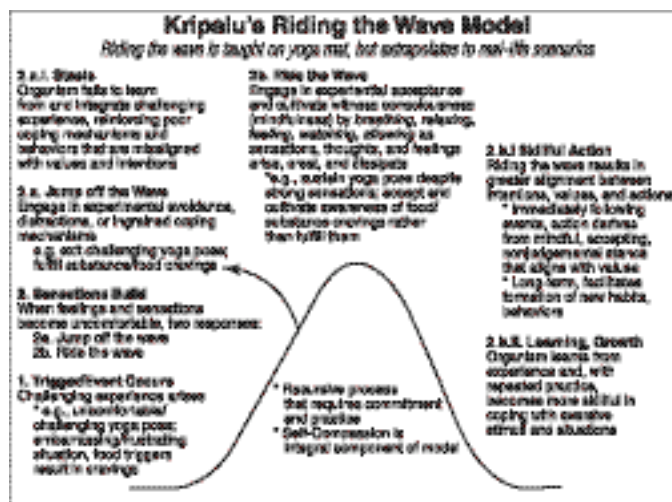
Kripalu Yoga and Acceptance/Mindfulness

Kripalu yoga philosophy and methodology share many theoretical and pragmatic parallels with acceptance- and mindfulness-based approaches. This is not surprising given that the aim of yogic practices, cultivation of witness consciousness, is operationally synonymous with some modern concepts of mindfulness. In the Kripalu tradition, *witness consciousness* is defined as adopting an objective, nonjudgmental, accepting, and nonreactive stance to internal and external experience.⁹

Kripalu yoga fosters witness consciousness with its “riding the wave” methodology, an approach that parallels urge surfing and differs only in its focus on embodiment, including use of yoga postures, relaxation, and breath (see Figure 1).⁴² As an example of how this method is applied, students are led into a pose and encouraged to ride the wave of sensation by breathing, relaxing, feeling, watching, and allowing as sensations, thoughts, and emotions arise and pass, thus cultivating experiential acceptance and cognitive defusion. By contrast, “jumping off” the wave is conceptualized as engaging in habitual behavior that conflicts with goals

and objectives (e.g., avoiding yoga poses that may challenge the ego, or eating a box of cookies when endeavoring to moderate dessert intake). Kripalu yoga instructors often extrapolate riding the wave on the yoga mat (in challenging or aversive poses) to difficult real-world experiences. They teach participants that this method can be used as a roadmap for experiential acceptance, values commitment/action, and cultivation of witness consciousness in daily life.

Figure 1. Riding the Wave. Modification of chart initially described in Kripalu Yoga Teacher Training Manual.⁴²



Kripalu yoga is noteworthy in that it explicitly encourages students to listen to their bodies and allow inner wisdom to guide asana and movement, even if it means doing something differently from the rest of the class.⁹ Development of inner wisdom may cultivate greater attunement to endogenous signals, which may in turn foster implicit self-regulation of eating and other health behaviors.

Finally, Kripalu yoga strongly emphasizes that practitioners live “authentically” and in “alignment” with personal values, a practice termed skillful action (see Figure 1, 2.b.i). The origin of this concept is the Hindu principle of dharma, which loosely translates to “upholding right and aligned behavior and action.” Recursively riding the wave fosters dharma by strengthening witness consciousness, which cultivates experiential acceptance and identification of core values. As values are elucidated and the individual’s ability to be mindful, compassionate, and nonreactive increases with repeated practice, core values increasingly become a blueprint for action that aligns with goals. As this process occurs, maladaptive behavioral schemas that do not align with core values are gradually replaced with healthier orientations, cognitions, and behaviors.

Skillful action shares much in common with ACT’s emphasis on commitment and action. Research suggests values clarification may prove an effective approach for weight management.⁴³

IWL and Acceptance/Mindfulness

The IWL program incorporates Kripalu yoga methods intended to promote mindfulness and experiential acceptance, including riding the wave and skillful action. These methods are interwoven in the yoga, fitness, and mindful eating activities and are used to frame the nutrition and lifestyle lectures. For example, in the session titled “Obstacles: Commitment and Strategies,” participants are encouraged to identify their core values and commit to action that aligns with these values by using witness consciousness and self-compassion. In yoga and fitness classes and in mindful eating activities and nutrition lectures, participants are encouraged to practice riding the wave when limiting thoughts or habitual behavioral templates (termed *samskara* in Sanskrit) generate experiential avoidance that may prevent them from successfully reaching their goals.

Self-Compassion

Self-compassion is defined as acknowledging that suffering, failure, and inadequacy are part of the human condition, and that all people—oneself included—are worthy of compassion.⁴⁴ Self-compassion has been shown to buffer depression and anxiety⁴⁵ and moderate reactivity to negative events.⁴⁶ Adams and Leary hypothesize that self-compassion may lead people to forgive themselves for an instance of diet breaking without losing sight of goals to regulate their eating, a conceptual analogue to ACT’s use of experiential acceptance for weight control-related behaviors.⁴⁷

Kripalu Yoga and Self-Compassion

Kripalu means “compassionate, kind, merciful” in Sanskrit.⁹ The importance of self-compassion is embedded in each Kripalu yoga class, where students are actively encouraged to foster self-compassion to attenuate self-judgment. For instance, when judgmental cognitions or aversive sensations arise during yoga practice, students are instructed to ride the wave and cultivate witness consciousness with compassion. Self-compassion is offered to strengthen the student’s capacity to more skillfully experience and manage challenging sensations and situations. This practice may reduce reactivity to internal discomfort, shame, or self-judgment that drives experiential avoidance and habitual, maladaptive behaviors theorized in Kripalu yoga and ACT to inhibit alignment of behaviors, values, and goals.^{9,23}

Kripalu yoga thus explicitly emphasizes the importance of cultivating experiential acceptance with deep compassion for the full array of experience as it unfolds. Using riding the wave, this tradition aims to instill emergent and endoge-

nous levels of awareness, believed to foster enactment of the most skillful, compassionate action available at any given moment.⁹

IWL and Self-Compassion

Self-compassion, as a foundation of Kripalu yoga, is pivotal in IWL’s execution and is interwoven throughout the program. Participants are taught the importance of this precept from the opening lecture. In addition to a lecture that explicitly addresses self-compassion and body image, all sessions emphasize the importance of self-care and listening to and honoring the needs of one’s body.

Yoga

Cross-sectional evidence suggests yoga practitioners may experience attenuated weight gain,⁴⁸ lower BMI,^{32,48,49} greater levels of mindful eating,³² increased intuitive eating and spirituality,⁵⁰ and improved health behaviors^{48,51} than do non-yoga practitioners. Numerous intervention studies have suggested that yoga is effective for facilitating weight loss and reducing BMI.⁵²⁻⁵⁴

In addition to cross-sectional evidence that suggests yoga interventions improve eating behaviors, preliminary research suggests that the interventions may also improve mood disturbance⁵⁵ and self-compassion^{54,56,57} and promote healthy lifestyle behaviors even when they are not prescribed.⁵⁸ Qualitative evidence suggests yoga may improve food consumption quantity and choices, eating behaviors, and self-empowerment for obese women with binge eating disorder (BED).^{58,59} An investigation of body image and eating attitudes among female yoga practitioners suggested improvements in body satisfaction and perceptions of disordered eating since beginning yoga practice, which subjects attributed to increases in spirituality and “reconnection” with their bodies.⁶⁰ Kristal postulated that psychological well-being and increased body awareness may prompt increased mindfulness of satiety, hunger, and overeating among yoga practitioners, thereby potentiating weight gain and supporting weight management efforts.⁴⁸

Kripalu Yoga and IWL

Kripalu yoga may be especially well suited for use with an overweight/obese population. This form of hatha yoga tends to be gentle and may be more easily tolerated by larger bodies or those not used to more vigorous movement. The emphasis on self-compassion may counteract negative self-concept, shame, or criticism commonly experienced in this population, and the self-acceptance and nonjudgment

that are hallmarks of Kripalu yoga may prove similarly antidotal. The intrinsic integration of mindfulness, experiential acceptance, honoring of inner wisdom, and support for aligning core values with purpose and action may catalyze psychological well-being, health behavior change, and weight management efforts. Finally, as with most forms of yoga, Kripalu yoga incorporates seated meditation (*dhyana*), the relaxation response (*sauvasana*), and deep-breathing exercises (*pranayama*), all of which have been theorized to activate the parasympathetic nervous system, balance the hypothalamic-pituitary-adrenal and the sympathetic nervous system (HPA/SNS) axis response to stress, and improve a host of related physical and mental health concerns.⁶¹⁻⁶³

The IWL program offers gentle Kripalu yoga for 90 minutes daily. It also uses Kripalu yoga methodology for its underlying program structure.

This Study

Given preliminary research suggesting improvements in self-compassion,^{54,56} mindfulness,^{56,57} mood disturbance,⁵⁵ and perceived stress⁵⁶ following Kripalu yoga-based programs, our aims were twofold: (1) test the impact of the IWL program on mood disturbance and weight-related health behaviors (nutrition, physical activity), hypothesizing that significant improvements would be observed (a) postprogram (Time 2) with (b) maintained effect at 3-month follow-up (Time 3); and (2) test the impact of the IWL program on self-report body weight at 1-year follow-up, hypothesizing that significant reductions in body weight would occur.

Methods

Recruitment

Data analysis procedures were approved and overseen by the New England Institutional Review Board. Participants were recruited from 6 successive cohorts of IWL program registrants from July 2008 to May 2009. Participants were required to have a BMI > 25 (overweight or obese). No respondents were otherwise excluded. Program registrants were notified by email of the opportunity to participate in research, and those who responded with interest were contacted by phone to answer questions and initiate informed consent. Formal consent describing the study procedures and ensuring confidentiality of data was obtained in person by the first author upon the subject's arrival at the program facility. One week before program launch, subjects were sent a link to an online survey that

comprised validated study questionnaires and demographic questions and used SurveyMonkey.com, a securely encrypted online interface. Postintervention questionnaires were completed within 1 week of IWL program completion, and again 3 months following completion. Data on self-reported weight loss were collected at 1-year follow-up via email. Participants were sent reminder emails if questionnaires were not returned within 2 weeks postprogram and at 3-month follow-up points or if self-report weight information was not provided within 2 weeks of 1-year follow-up.

Intervention

A daily schedule of events for the 5-day IWL workshop is provided in Table 1. The program incorporated Kripalu yoga methods intended to promote mindfulness with yoga, fitness, and mindful eating activities that were used to frame the nutrition and lifestyle lectures. Ninety minutes of Kripalu yoga were offered daily in addition to other opportunities for personal reflection and mindfulness practice.

Measures

Using the 52-item Health-Promoting Lifestyle Profile II (HPLP),⁶⁴ participants recorded frequency of self-reported health-promoting behaviors in the domains of health responsibility, physical activity, nutrition, spiritual growth, interpersonal relations, and stress management, with a Likert scale ranging from 1 (*never*) to 4 (*routinely*). We focused on 4 subscales (stress management, spiritual growth, physical activity [PA], modified nutrition-related behaviors). Several of the nutrition items were neither in line with current U.S. dietary recommendations nor recommended in the IWL program (e.g., "eat 6–11 servings of bread, cereal, rice, and pasta each day"). Consequently, we used a modified nutrition subscale with 4 items (breakfast frequency, low-fat, fruit, vegetable intake) instead of the 9 items in the original subscale. HPLP-II has good reliability and validity.⁶⁴

The Self-Compassion Scale (SCS) is a 26-item measure that assesses one's ability to be forgiving and kind to oneself in difficult circumstances.⁶⁵ The SCS uses a Likert scale ranging from 1 (*almost never*) to 5 (*almost always*) and includes 6 components (self-kindness, self-judgment, common humanity, isolation, mindfulness, overidentification) that load on a single higher order factor from which a total score of general self-compassion can be derived. The SCS has been shown to be valid and reliable.⁴⁵

The Five Facet Mindfulness Questionnaire (FFMQ)⁶⁵ is a 39-item scale that measure 5 facets of mindfulness: observing (attending to or noticing internal and external

Table 1. *Sample IWL Program Structure*

Sunday	
7:30–9:00 pm	Opening session (<i>set context for acceptance, self-compassion, mindfulness, self-care</i>)
Monday	
7:00–8:00 am	Fitness walk (<i>mindful fitness</i>)
9:00–11:00	Holistic Health and Weight Loss (<i>lecture</i>)
1:30–3:00 pm	Mindful/Intuitive Eating (<i>workshop</i>)
3:10–4:00	Share circle
4:15–5:45	Integrative Weight Loss Yoga (<i>introductory yoga class</i>)
Tuesday	
7:00–8:00 am	Fitness walk
9:00–11:00	<i>Free time for self-care (walking, journal, sauna, etc.)</i>
11:00–12:00 pm	Get Fit: Tone and Strengthen (<i>mindful exercise</i>)
1:30–3:00	Nutrition and Natural Weight Management (<i>lecture</i>)
3:10–4:00	Share circle
4:15–5:45	Kripalu Yoga
Wednesday	
7:00–8:00 am	Self-guided fitness walk
9:00–10:00	Free time for self-care
10:00–11:30	Menu planning (<i>workshop</i>)
1:30–3:00 pm	Body Image: Developing Self-Compassion (<i>workshop</i>)
3:10–4:00	Share circle
4:15–5:45	Kripalu Yoga
7:30–9:00	Whole Foods Cooking Demo (<i>workshop</i>)
Thursday	
7:00–8:00 am	Fitness walk
9:00–11:00	Free time for self-care
11:00–12:00 pm	Get Fit: Tone and Strengthen
1:30–3:00	Obstacles: Commitment and Strategies (<i>workshop</i>)
3:10–4:00	Share circle
4:15–5:45	Kripalu Yoga
Friday	
6:30–7:45 am	Kripalu Yoga
9:00–10:30	Closing session

stimuli), describing (noting or mentally labeling these stimuli with words), acting with awareness (attending to one's current actions), nonjudging of inner experience (refraining from evaluations), and nonreactivity (allowing thoughts and feeling to come and go). Responses are given on a 5-point Likert scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*). The FFMQ does not offer a global score, because subscales do not load on a single higher order factor. The 5 subscales have shown good internal consistency.⁶⁵

Profile of Mood States (POMS)⁶⁶ is a self-rated scale of 65 adjectives rated on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). This well-known, well-validated, reliable measure was designed to provide a total mood disturbance score and subscale scores for 6 mood states: tension-anxiety, depression-dejection, anger-hostility, vigor-

activity, fatigue-inertia, and confusion-bewilderment. Because all subscales load on a single higher order factor, the total mood disturbance score is reported here.⁶⁶

Standard demographic information was collected on all participants, including gender, age, BMI category, income, education, and race.

Self-Reported Body Weight was collected at 1-year follow-up. Research participants were asked to provide current information about weight before participating in the IWL program and at 1-year follow-up. The program itself deemphasized short-term weight loss, focusing instead on sustainable changes in lifestyle and health behaviors. To focus on psychological mechanisms of health and behavior change and deemphasize the subjects' focus on weight, we did not collect weight at baseline, postprogram, and 3-month follow-up.

Data Analyses

Analyses were completed using the Statistical Package for the Social Sciences (SPSS), version 19. Students' *t*-tests were used to compare mean values from baseline to postintervention (significance of $\alpha = 0.05$, two-tailed). A Bonferonni correction was then applied to the testing scheme to take into account the number of tests we used. All reported effect sizes were statistically significant.

Results

Response Rates

Of the 118 program participants initially contacted, 55 expressed interest in participation and 37 underwent informed consent procedures, completing all or part of the baseline surveys. Of these, 31 completed postprogram surveys (84%), 18 completed follow-up surveys 3 to 4 months following program completion (49%), and 19 provided body weight data at 1-year follow-up (51%), 14 for whom we also had 3-month follow-up data (38%). Despite as many as 3 attempts at contact, no reasons were provided by those who failed to complete research at postprogram and follow-up.

Attrition Analyses

To determine whether participants at baseline who continued to participate at Time 2 differed from those who dropped out of the study, *t*-tests were conducted on all baseline study variables. No variables were statistically significantly different between those who completed and did not complete the study. A similar set of analyses was conducted

to determine whether individuals who participated in the study but dropped out by the 3-month and 1-year follow-up differed from those who completed the study. Again, there were no statistically significant differences between groups.

Sample Description

The sample was primarily female and middle-aged, and exclusively Caucasian. Eighty-four percent were classified as obese (BMI ≥ 30), most had high levels of education and income, and more than two-thirds were employed part time or full time outside of the home.

Changes from Baseline to Postintervention

As shown in Table 2, improvements were seen on all study variables from pre- to postintervention. On the health profile scores, large effects were noted for physical activity (PA) and medium-sized effects were noted for nutrition, spiritual growth, and stress management. Decline in negative mood was significant, as was increase in self-compassion. All the mindfulness facets evinced increases: the increase in observation was large, and increases in description, acting with awareness, nonjudgment, and nonreactivity were all medium sized. All results obtained pre- and postprogram remained statistically significant with the Bonferroni correction ($p < 0.004$).

Changes From Baseline to 3-Month Follow-Up

When considering changes observed from baseline to follow-up, some effect sizes appeared to increase and others decreased (see Table 3). On the HPLP-II scores, a large effect size was observed for improved nutrition and stress management, and a medium-sized effect was noted for spiritual growth. The change in PA was negligible, and the increase in self-compassion was large. Increases in all mindfulness subscales remained, although only 3 reached statistical significance: increases in observation, nonjudgment, and nonreactivity.

When the results were examined after a Bonferroni correction was made to adjust for the large number of tests ($p < .004$), only the HPLP-II stress management subscale, self-compassion, and FFMQ and nonreactivity facets remained statistically significant.

Changes in Weight From Baseline to 1 Year

Pre- to postchanges in reported weight ($n = 19$) dropped from a mean of 204.63 ($SD = 42.69$) to 187.68 ($SD = 42.89$), $t(18) = 2.09$ ($p < .001$), Cohen's $d = 0.99$.

Table 2. Paired Samples *t*-tests, Baseline to Postprogram ($n = 31$)

	Preprogram	Postprogram	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
HPLP					
Nutrition modified					
<i>M</i>	2.71	3.25	-3.72	0.001	-0.77
<i>SD</i>	0.66	0.64			
Physical activity					
<i>M</i>	2.19	2.61	-4.22	0.000	-0.84
<i>SD</i>	0.73	0.77			
Spiritual growth					
<i>M</i>	2.64	3.05	-3.56	0.002	-0.71
<i>SD</i>	0.59	0.62			
Stress management					
<i>M</i>	2.28	2.63	-3.99	0.001	-0.78
<i>SD</i>	0.57	0.5			
POMS					
Total					
<i>M</i>	71.30	42.49	6.29	0.000	1.18
<i>SD</i>	29.67	24.67			
SCS					
Total					
<i>M</i>	2.87	3.37	-4.48	0.000	-0.80
<i>SD</i>	0.73	0.67			
FFMQ					
Observe					
<i>M</i>	26.34	30.40	-7.23	0.000	-1.39
<i>SD</i>	5.33	4.16			
Describe					
<i>M</i>	27.33	29.03	-3.01	0.005	-0.59
<i>SD</i>	6.47	5.12			
Act w. awareness					
<i>M</i>	24.94	27.50	-3.44	0.002	-0.62
<i>SD</i>	5.28	4.59			
Nonjudgment					
<i>M</i>	26.50	29.34	-2.86	0.008	-0.57
<i>SD</i>	6.93	4.38			
Nonreactivity					
<i>M</i>	19.69	22.11	-4.13	0.000	-0.75
<i>SD</i>	4.15	4.68			

Note. HPLP = Health-Promoting Lifestyle Profile; POMS = Profile of Mood States; SCS = Self-Compassion Scale; FFMQ = Five-Facet Mindfulness Questionnaire.

Discussion

Results generally supportive of hypothesis 1a, that IWL would promote reduced mood disturbance and improved weight-related health following program completion. This outcome was expected because of programmatic elements targeted at improving these domains. All participants engaged in daily exercise and yoga and adhered to Kripalu's whole-foods buffet schedule (breakfast, lunch, and dinner) during the 5-day program, which likely contributed to observed health behavior improvements.

Table 3. Paired-Samples *t*-tests, Baseline to 3-Month Follow-Up (*n* = 18)

	Preprogram	3-Mo Follow-up	<i>t</i>	<i>p</i>	Cohen's <i>d</i>
HPLP					
Nutrition modified					
<i>M</i>	2.82	3.14	-2.97	0.014	-0.92
<i>SD</i>	0.56	0.47			
Physical activity					
<i>M</i>	2.20	2.31	-0.65	0.529	-0.12
<i>SD</i>	0.71	0.85			
Spiritual growth					
<i>M</i>	2.59	2.87	-2.53	0.025	-0.70
<i>SD</i>	0.45	0.48			
Stress management					
<i>M</i>	2.18	2.51	-3.81	0.002	-0.96
<i>SD</i>	0.58	0.56			
POMS					
Total					
<i>M</i>	65.79	59.04	0.82	0.425	0.21
<i>SD</i>	17.22	29.97			
SCS					
Total					
<i>M</i>	2.78	3.39	-4.39	0.000	-1.07
<i>SD</i>	0.65	0.53			
FFMQ					
Observe					
<i>M</i>	26.33	29.83	-4.44	0.000	-1.11
<i>SD</i>	5.82	4.63			
Describe					
<i>M</i>	27.33	29.78	-1.82	0.087	-0.45
<i>SD</i>	6.47	4.88			
Act w. awareness					
<i>M</i>	24.06	25.53	-1.63	0.121	-0.39
<i>SD</i>	5.12	4.63			
Nonjudgment					
<i>M</i>	26.61	27.41	-2.06	0.055	-0.56
<i>SD</i>	28.68	5.21			
Nonreactivity					
<i>M</i>	19.19	24.19	-3.95	0.001	-1.03
<i>SD</i>	21.64	3.02			
<i>Note.</i> HPLP = Health-Promoting Lifestyle Profile; POMS = Profile of Mood States; SCS = Self-Compassion Scale; FFMQ = Five-Facet Mindfulness Questionnaire.					

The emphasis on social support, mindfulness, self-compassion, and experiential acceptance in the program also likely facilitated improvements in markers of psychological well-being immediately postprogram.

Hypothesis 1b, that changes would persist at 3-month follow-up, was partially supported in that some, but not all, improvements noted immediately after the program, persisted. Increases in PA postprogram are congruent with findings for some yoga⁵⁸ and nondieting interventions,^{19,67} although with other nondieting programs, participants returned to baseline levels following program completion.⁶⁸ At follow-up, we may have seen no significant changes in PA because of attrition and limitations of 3-month follow-up as the final collection point; in a year-long follow-up of

participants in a HAES intervention, PA fluctuated before stabilizing at a level higher than baseline.⁶⁹

Postprogram improvements on the modified nutrition HPLP subscale (breakfast-eating, low-fat, fruit and vegetable intake) are consistent with findings from nondieting interventions⁶⁷ and qualitative reports following a yoga program for overweight women with BED,⁵⁹ and with cross-sectional literature suggesting improved nutrition among yoga practitioners.^{48,51,70}

Reductions in mood disturbance postprogram align with reductions observed following participation in nondieting and yoga interventions.^{19,54,71,72} Lack of reduction in mood disturbance 3 months following program completion, despite strong outcomes for self-compassion (a demonstrated predictor of psychological well-being),⁷³ may reflect a lack of sensitivity of this mood measure relative to its ability to capture changes for this treatment-seeking sample.

Improvements on all 5 mindfulness facets postprogram likely reflect the program's emphasis on mindfulness skills and training and mirror increases in mindfulness following participation in mindfulness- and yoga-based weight loss programs.^{36,38,54} Given the still-evolving conceptualization of the FFMQ and its facets, there may be numerous (and conflicting) explanations for the lack of continued improvement at 3-month follow-up on the describe, act with awareness, and nonjudgment mindfulness facets.⁷⁴ Another possibility is that the FFMQ may not measure the dimensions of mindfulness most salient in this overweight/obese, weight loss-seeking sample. The Philadelphia Mindfulness Scale, for example, measures acceptance as well as awareness, whereas the FFMQ does not measure acceptance.²²

Hypothesis 2, that significant weight loss would be observed 1 year following program completion, was partially supported but must be interpreted with caution, given the 51% attrition rate. This finding is consistent with some,^{19,69,75} but not other, studies indicating sustained weight loss at 1 year or longer following nondieting interventions.^{18,67} While core aspects of HAES were integrated into IWL, identified hindrances to behavioral adherence were targeted using riding the wave, mindfulness, and self-compassion training, reflecting elements of third-wave behavioral approaches. Outcomes were consistent with ACT-based²⁴ and mindfulness-based³⁵⁻³⁸ approaches to weight management, despite IWL's deemphasis on weight loss.

Persistent improvements with respect to the self-compassion, mindfulness facets, and spiritual growth/ stress management HPLP subscales at 3 months suggest that these variables may be implicated in health behavior change and weight management. We lack data on whether participants continued to practice yoga between baseline and 3-month follow-up, so it is unknown whether these changes

were residual benefits from the 5-day program or whether they were fostered by a continuous yoga practice. The lack of significant change in PA at 3 months suggests the latter to be less likely.

Study Limitations

Despite promising preliminary findings, this study can at best be classified as hypothesis generating. A number of limitations are worth noting. No control group or randomization procedures were used, precluding conclusions regarding the specific mechanisms of change. The nutrition subscale of the HPLP was modified and has yet to be validated. Weight loss information was self-reported and collected 1 year following program completion and was subject to recall errors and discrepancies between actual and reported weight among overweight and obese individuals.⁷⁶ This bias may be less common among women, however, who comprised the sample predominantly.⁷⁷

Participants self-selected into the program and were predominantly Caucasian, female, and had high levels of education and income, reflecting cultural biases common to U.S. yoga practitioners and considerably limiting generalization of our findings.⁷⁸ It has been suggested that nondieting approaches potentially have maximal salience for this demographic, who may be at greater risk of exposure to thin body ideal norms, social stigma, and chronic dieting and conceivably are more likely to experience psychologically mediated increases in body weight than are more socioeconomically and ethnically diverse groups.²⁰

Less than half of the participants in the IWL programs expressed initial interest in the study, which raised concerns about sample generalizability. The high attrition rate may also have produced a biased sample, and we were unable to obtain information regarding motivation for discontinuing participation. Although attrition analyses found no significant differences demographically and on any study measures between completers and noncompleters, some unmeasured differences that account for their lack of participation may be important for understanding weight and health behaviors. There are several potential explanations for the high attrition rate. One may be that study participants who did not succeed in losing weight did not report back at 3-month and 1-year follow-up. The survey length (roughly 1.5 hours) and lack of remuneration also may have discouraged continued participation.

The program was held residentially in a retreat setting, which seriously limited generalization of findings to community settings, because the conditions would be nearly impossible to replicate (e.g., whole-foods buffet, sauna/whirlpool, beautiful view). This also confounds results, because observed improvements may be explained

by reference to the program itself or to the general retreat environment. However, comparable improvements in psychological well-being^{54,55} and weight loss⁵⁴ have been observed in other studies that measured the impact of Kripalu yoga not taught in the retreat setting.

Participants in this study evinced much higher levels of mood disturbance at baseline than did those in several other samples of treatment-seeking obese individuals.^{79,80} This population tends to have significantly higher levels of psychological stress and mood disturbance than those who do not seek treatment⁶ or those recommended for bariatric surgery.⁸¹ This is consistent with research that has suggested there are more mental health concerns among those drawn to yoga,⁷⁰ a group also shown to demonstrate higher levels of disordered eating.⁸²

The multifaceted nature of the program was designed for optimal effectiveness but rendered it challenging to discern which program constituents fostered observed changes. For instance, the unique contributions of yoga, calisthenics, physical activity, nutrition lectures, body image self-compassion exercises, and other components cannot be determined and warrant individual examination in future research. In addition, we did not measure whether enrollees were yoga naïve or experienced yoga practitioners. Yoga experience may have moderated treatment effects, outcomes, and attrition. Last, we did not track yoga practice following program completion, which could have afforded additional insight into mechanisms and processes of change.

Future Directions

Although the high attrition rate and exploratory nature of our analysis limit our findings, results suggest that IWL may promote improvements in psychological well-being, nutrition-related health behaviors, and weight loss among individuals who report high levels of mood disturbance.

The multifaceted nature of the IWL program and the study design may prevent us from attributing increases in mindfulness and self-compassion solely to yoga, but other work in this area suggests yoga may be a contributor.^{54,57,83,84} As such, our findings make a novel contribution to this emerging literature and generate questions about how yoga may foster improvements in mindfulness, self-compassion, and other variables hypothesized to mediate health behavior change and weight management. Future research should examine relationships between these variables, capture eating behaviors, and determine the potential mediators and moderators of respective effects on health behaviors and weight loss.

Questions could be raised regarding the putative contributions of (1) Kripalu yoga “on the mat” (e.g., meditation,

breathing, postures, relaxation) and related aspects that may extrapolate “off the mat” (e.g., mindfulness, experiential and self-acceptance, self-compassion, stress management, spiritual growth); (2) additional program/environmental elements (e.g., social support, nutrition, physical activity, retreat environment); and (3) known concerns in yoga research (e.g., teacher effects, expectancies, physical contact) regarding our results.

Because the Eight-Limbed Path as a system is reflected by the curricula delivered in the IWL protocol, parsing out differential contributions of various elements was not an aim of this exploratory study. Future research would benefit from operationalization and investigation of each limb, as well as the aforementioned areas. Findings from such work would enable discernment of yoga’s contextual contributions and render clearer the settings in which it and related elements are most effective, and in turn better inform future program development and research.

We hypothesize Hatha yoga’s positive effects to be derivative from and additive to the effects of mindfulness-based, self-compassion-based, and acceptance-based approaches. Hatha yoga that integrates these approaches may prove especially well suited for standalone or adjunctive treatment of psychologically mediated etiologies of obesity. Hatha yoga’s effects on body weight, eating, and health behaviors may also function through physiologic pathways (e.g., modest increases in caloric expenditure,⁸⁵ optimization of HPA/SNS axis functioning,⁶¹ improved serum adiponectin levels and metabolic syndrome factors,⁸⁶ increased brain gamma-aminobutyric acid levels)⁸⁷ that may counteract overall reductions in metabolism observed following longer term yoga practice⁸⁸ and reduce stress-related eating behaviors.⁶¹ Future investigations may benefit from the study of yoga’s effects on these variables and may determine which are most relevant for psychological health, weight management, and improved health/eating behaviors.

Finally, given obesity-associated public health expenditures projected to increase by \$48–\$66 billion annually by 2030, such research should be conducted with consideration of practical relevance for public health.² This approach would include research targeting accessibility and a broader sociodemographic spectrum, particularly given higher rates of obesity among lower SES groups⁸⁹ and the sociodemographic and ethnic homogeneity of U.S. yoga practitioners.⁷⁸ If found to be efficacious, yoga’s widespread acceptability⁹⁰ and availability may render it well situated to attenuate the obesity pandemic and related physical and psychological comorbidities.

In sum, the results of this study suggest the potential utility of a multicomponent, yoga-based approach to foster psychological well-being and weight management among treatment-seeking obese individuals with high levels of

mood disturbance. Future research is needed to understand the potential efficacy of yoga-based approaches for weight management and to discern which facets have greatest relevance for psychosocial and metabolic health, weight management, and behavior change in differential behavioral, psychologic, and biologic phenotypes.⁹¹

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Conflict of Interest Statement

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Research

A Responder Analysis of the Effects of Yoga for Individuals With COPD: Who Benefits and How?

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Abstract

Background: We previously reported that a twice-weekly, modified Iyengar yoga program was a safe and viable self-management strategy for patients with chronic obstructive pulmonary disease (COPD).¹ **Objective:** The primary purpose of this exploratory analysis was to classify yoga participants into 1 of 3 responder categories by using minimum clinically important difference (MCID) criteria for each of 3 variables: 6-minute walk distance (6MW), distress related to dyspnea (shortness of breath; DD), and functional performance (FPI). Changes in health-related quality of life (HRQL) and in psychological well-being (anxiety and depression), and participants' self-reported improvements by responder category were also examined. A secondary goal was to identify baseline participant characteristics, including initial randomization assignment that might predict response to treatment. **Methods:** Participants were randomly assigned to either an initial yoga (IY) or an enhanced wait-list control (WLC) group. Those in the WLC group were offered the yoga program immediately following the IY group's participation. Individuals from both groups who completed at least 18 of 24 yoga classes were categorized as responders, partial responders, or nonresponders for each of the 3 outcome variables (6MW, DD, FPI) on the basis of MCID criteria. Baseline characteristics and changes in HRQL and psychological well-being were also analyzed. **Results:** None of the participants demonstrated MCIDs for all 3 outcomes; however, 6 were classified as responders for 2 outcome variables and 4 were classified as nonresponders for all 3 outcome variables. Two-thirds of the female participant group and one-third of the male participant group completed the yoga program. DD responders showed increased anxiety levels, whereas anxiety levels of the DD nonresponders remained unchanged. FPI responders reported significant improvements in physical function, whereas partial- and non-FPI responders noted declined function. Participants assigned to the IY group demonstrated greater benefit from yoga than did those in the WLC group. **Conclusions:** Although this modified Iyengar yoga program appears to have benefited some individuals with COPD, further studies are required to assess who the intervention works for and under what conditions.

Key Words: Yoga, yoga therapy, COPD, Iyengar yoga, responder analysis

Introduction

A growing body of research has demonstrated that yoga can be beneficial for patients with chronic obstructive pulmonary disease (COPD). Studies report significant reductions in dyspnea (shortness of breath),² “easier control” of dyspnea attacks, decreased dyspnea-related distress,^{1,3} and improvements in respiratory patterns,^{3,5} exercise performance,^{1,3} and health-related quality of life⁶ following participation in a yoga program. In a recent pilot study we demonstrated that 12 weeks of modified Iyengar yoga classes proved safe, feasible, and enjoyable for elderly adults with COPD.¹ Yoga group participants demonstrated increased exercise endurance and reported functional performance improvements and reduced distress related to dyspnea (DD), compared with those randomly assigned to an enhanced wait-list control (WLC) group. In light of these findings, we were interested in identifying which individuals with COPD might derive the greatest benefit from participating in a yoga program.

Several studies have used a responder analysis approach to examine individual difference factors relative to a number of outcomes. Dionne and colleagues⁷ developed a responder analysis strategy to identify individual-level differences related to pain. Others have used a responder analysis approach to determine clinically meaningful interindividual differences in outcomes of patients with cancer.⁸ The term *responder* refers to an individual who demonstrates improvement relative to an outcome of interest. Improvement can be classified using the minimum important clinical difference criteria (MCID). The MCID is the smallest difference in an outcome score that a patient perceives as beneficial.¹⁹

The primary purpose of this exploratory analysis was to identify responders who evidenced MCIDs in 6-minute walk (6MW) performance, DD, and functional performance (FPI) following participation in a 12-week modified Iyengar yoga program. Changes in health-related quality of life (HRQL), psychological well-being, and participants' reports of improvement based on their response to treatment were also evaluated. A secondary goal was to identify baseline characteristics, including initial randomization assignment that might predict response to treatment. Because this was an exploratory analysis, no hypotheses were generated.

Methods

This secondary analysis used data originally collected in a clinical pilot study in which participants were randomized to either a 12-week modified Iyengar yoga (IY) intervention

or an enhanced WLC group.¹ At the conclusion of the initial 12-week study, participants in the WLC group were offered an identical but separate 12-week yoga program. Baseline evaluations were conducted immediately before the onset of yoga classes. Outcome data were collected within 1 week following the conclusion of the yoga program. Participants completed a semistructured exit interview after the final assessment. Outcome variables from the original study included a 6MW, DD, and the total FPI, which were reported in the primary outcome paper.¹ Physical and mental functioning, HRQL, depression, and anxiety were measured, and subjective reports of the effects of participation in the yoga program were also obtained.

Participants

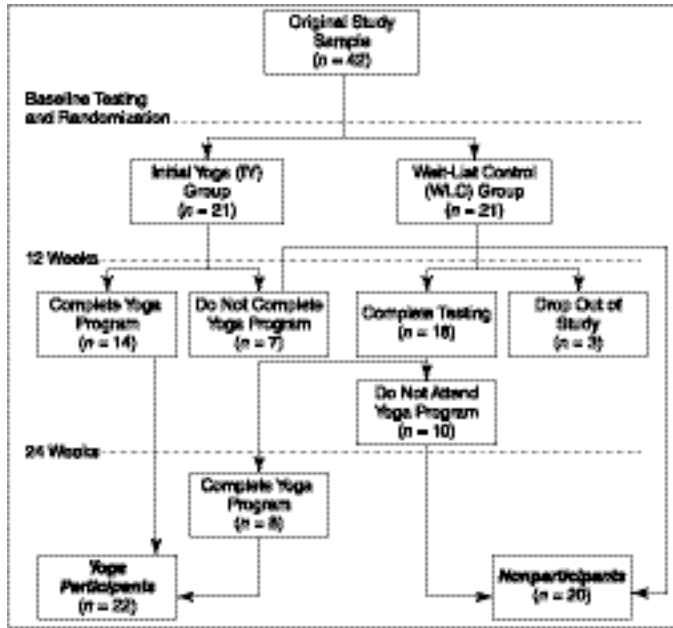
Participants with COPD were recruited from American Lung Association Better Breathers Clubs by means of advertisements, letters, and emails to physicians between April 2004 and June 2005. Individuals who were at least age 40 years whose activities of daily living were limited by DD from clinically stable COPD were included.¹⁰ Those receiving supplemental oxygen were selected if their oxygen saturation could be maintained at $\geq 80\%$ on ≤ 6 liters/minute of nasal oxygen during the 6MW. Participants who had active symptomatic illness (e.g., ischemic heart disease, neuromuscular disease, psychiatric illness) and those who had completed a pulmonary rehabilitation, yoga, or exercise training program in the past 6 months were excluded. Over 14 months, 210 individuals were screened by telephone; 42 participants were randomly assigned to either the IY or the WLC group. The institutional review board of the University of California, San Francisco (UCSF), approved the study protocol.

For this analysis, participants from the IY group and the WLC group were included if they had completed at least 18 of 24 yoga classes and the baseline and postintervention assessments (Figure 1). Age of the initial 42 participants ranged from 42 to 88 years, whereas the age range for those included in this analysis ranged from 57 to 86 years (see Table 1). Individuals from the IY group who dropped out or failed to complete posttesting and those from the WLC group who did not elect to participate in the yoga program or failed to complete either the 12- or 24-week assessment were excluded from these analyses.

Interventions

Participants were offered twice-weekly, 1-hour yoga sessions (24 classes) that consisted of yoga asanas (poses) interspersed with *visama vritti pranayama* (timed breathing).

Figure 1. Participant progression through the yoga/COPD study.



Each student was given a videotape of one representative yoga class and was strongly encouraged to practice daily. The yoga program was developed by a consensus panel of expert yoga teachers who had experience with subjects with chronic pulmonary diseases. Although the members of the yoga expert panel represented a variety of yoga traditions,

Iyengar yoga was modified for this elderly population. Props, including blankets, bolsters, blocks, and chairs, were incorporated into the asana sequences. Three experienced yoga teachers provided instruction and modified the postures according to the needs of the participants. Students could decline to perform poses; however, with modifications and appropriate use of props, this rarely occurred. Classes were held at a yoga studio in the Osher Institute of Integrative Medicine in San Francisco. There were no preparatory classes, although an introduction to yoga practice was included during the first class. Attendance at each class ranged from 3 to 7 participants. See Appendix A for a complete description of the yoga protocol, including duration of poses, props used, and associated breathing exercises.

Baseline data were collected immediately before the 12-week yoga program, and the postintervention assessment was conducted within 1 week following the intervention conclusion. Participants performed spirometry 15–20 minutes after 2 puffs of albuterol administered via spacer (Aerochamber; Monaghan, Plattsburg, NY). Spirometry was performed at each assessment point using a Koko spirometer (Pulmonary Data Services, Louisville, CO).¹¹

Outcome Measures

Participants performed 2 6MWs approximately 30 minutes apart in a straight hospital corridor. The walk of the greatest distance was used for analysis.¹² DD was meas-

Table 1. Baseline Characteristics

Variable	Yoga (n = 22)	Nonparticipants (n = 20)	p Value	IY (n = 14)	WLC (n = 8)	p Value
Age, years (range)	70.6 ± 8.0(57-86)	68.3% ± 10.1(42-88)	ns	72.2 ± 6.4 (61-84)	67.6 ± 9.9(57-86)	ns
Gender, female/male (n/n)	17 (77%) / 5(23%)	11 (55%) / 9 (45%)	ns	10 (71%) / 4 (29%)	7 (88%) / 1 (12%)	ns
FEV1 (% predicted)	48.5 ± 13.2	41.1 ± 18.7	ns	51.2 ± 10.5	43.8 ± 16.6	ns
FEV1/FVC ratio	0.45 ± 0.08	0.45 ± 0.12	ns	0.46 ± 0.08	0.43 ± 0.09	ns
Comorbidities	1.25 ± 1.0 (n = 20)	1.15 ± 1.0	ns	1.4 ± 1.2	1.0 ± 0.6	ns
Baseline exercise	2.9 ± 2.6	2.2 ± 2.9	ns	2.6 ± 2.1	3.4 ± 3.4	ns
6MW	1420 ± 338	1356 ± 355	ns	1388 ± 408	1509 ± 216	ns
DD-post 6MW	2.0 ± 2.5	2.1 ± 2.1	ns	2.6 ± 2.8	1.3 ± 1.5	ns
SOB-post 6MW	3.5 ± 1.9	3.8 ± 2.3	ns	3.8 ± 2.3	2.9 ± 1.1	ns
CESD	11.18 ± 7.1	14.35 ± 7.2	ns	9.5 ± 4.5	11.0 ± 7.0	ns
Educational level						
Partial college or more	19 (86%)	16 (80%)	ns	12 (86%)	7 (88%)	ns
High school or less	3 (14%)	4 (20%)	ns	2 (14%)	1 (12%)	ns
Living situation						
Live alone	8 (36%)	12 (60%)	ns	4 (29%)	4 (50%)	ns
With family or friend	8 (36%)	3 (15%)	ns	5 (38%)	3 (38%)	ns
With spouse	6 (28%)	5 (25%)	ns	5 (38%)	1 (12%)	ns
Oxygen use	4 (19%)	7 (35%)	ns	3 (23%) (n = 13)	0 (0%)	ns
Previous rehab attendance	13 (59%)	6 (30%)	ns	8 (62%) (n = 13)	5 (63%)	ns
Race, Caucasian	18 (82%)	16 (80%)	ns	10 (77%) (n = 13)	8 (100%)	ns
Current smoker	2 (9%)	3 (15%)	ns	2 (14%)	0 (0%)	ns

Note. IY = participants in the yoga program originally randomized to the initial yoga group; WLC = participants in the yoga program originally randomized to the enhanced wait-list control group; yoga (n = 22) = 14 participants from IY group + 8 participants from WLC group; FEV1% predicted = forced expiratory volume in 1 second, percentage of ideal predicted value; FEV1/FVC ratio: forced expiratory volume in 1 second/ Forced vital capacity ratio; comorbidities = number out of a total of 6: CVD, arthritis, CVA, seizures, back pain, diabetes; baseline exercise was measured by frequency of endurance exercise (days/week); 6MW = 6-minute walk; DD = distress related to dyspnea; SOB = shortness of breath intensity; CESD = Center for Epidemiological Studies Depression Scale.

ured before and after each 6MW with a modified Borg scale¹³ that asks the following questions: “How short of breath are you right now?” and “How bothersome or worrisome is your shortness of breath to you right now?” Health-related quality of life was measured by using the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36),^{14,15} which has 6 scales and 2 composite measures of physical and mental functioning. The FPI-short form (S-FPI) was used to measure functional performance as a component of HRQL.¹⁶ This 32-item, validated inventory has 6 subscales, namely, body care, household maintenance, physical exercise, recreation, spiritual activities, and social activities, which are summed for a total score. Depressive symptoms and anxiety were measured as indicators of psychological well-being. The Center for Epidemiological Studies Depression Scale (CESD)¹⁷ was used to measure depressed mood, and the Spielberger State Anxiety Inventory (SSAI) was used to measure state anxiety.¹⁸

During the semistructured exit interview participants were asked to discuss the benefits they experienced from yoga, whether they plan to continue to practice yoga, suggestions to improve classes, and observations of physiological improvement.

Statistical Analysis

The responder categories were created based on previously published criteria for the MCID for each outcome variable.¹⁹ Participants were classified as responders in the 6MW distance category if their distance increased by 120 feet or greater from baseline, partial responders if their distance from baseline increased by 1 to 119 feet, and nonresponders if their distance from baseline remained the same or decreased.²⁰ They were classified as responders for the DD outcome if their score increased by 1 point or more from baseline, as partial responders if their scores increased by 0.5 to 0.99 points from baseline, or as nonresponders if the score remained the same or decreased.²¹ Participants were classified as responders in the FPI if their scores increased by 0.3 points or more from baseline (top 20% because MCID is not available for this variable), as partial responders if their scores increased by 0.01 to 0.29 points or more from baseline, or as nonresponders if the score remained the same or decreased.

Descriptive statistics, independent sample *t*-tests for continuous variables, and chi square statistics for categorical variables were used to compare baseline characteristics of the participants in this exploratory analysis with those who were not included, and to examine baseline characteristics of each of the responder groups. To evaluate the relationship between responder groups and each dependent variable, a 2-way repeated measures analysis of variance (ANOVA) was

performed, with 1 between-subjects factor, responder group, and 1 within-subjects factor, time (before and after 12-week yoga class). This design enabled us to test the interaction of responder group by time. A *p* value < 0.05 was considered significant. Because all analyses were exploratory, we did not adjust for multiple comparisons. All analyses were conducted using SPSS version 18.0 (Chicago, IL: SPSS, Inc).

Results

Attrition Analyses by Group

Participant demographics by attendance (IY or WLC) are provided in Table 1. There were no significant baseline differences between those who participated in the yoga class (*n* = 22) and those who did not (*n* = 20; Table 1). Participants who had previously attended pulmonary rehabilitation were more likely to participate in the yoga class (59% vs. 30%, *p* = 0.06). Of the 14 men who originally enrolled in the study, 5 (36%) completed the yoga class, compared with 17 of 28 (61%) women who originally enrolled in the study.

Responder Analyses by Outcome Variable

Responder analyses were performed on the 22 yoga participants from each group (IY, *n* = 14; WLC *n* = 8). These data provided information regarding the percentage of participants by group that could be categorized as responders, partial responders, or nonresponders. Analyses were conducted separately for each of the 3 outcomes: 6MW distance, DD, and FPI.

Table 2 shows each yoga participant by group (IY or WLC) and responder classification based on their scores from the 6MW, DD, and FPI. No participant attained MCIDs for all 3 outcome variables. Six met MCID criteria for 2 of the 3 outcomes. Four participants remained the same or worsened in all 3 outcome categories. Of the 6 who demonstrated clinically important differences in 2 of the 3 categories, 5 individuals were assigned to the IY group and 1 used oxygen, although not continuously. Of the 4 participants who were nonresponders on all 3 outcomes, 3 were assigned to the control group, none used oxygen, and 2 had preexisting musculoskeletal injuries.

Although not statistically significant, differences between the IY and WLC groups in the percentage of participants categorized as responders and nonresponders for each of the selected outcomes were detected. For the 6MW distance, there were more responders (36% vs. 12.5%) and partial responders (43% vs. 12.5%) in the IY than in the WLC group (Figure 2A). As shown in Figure 2B, differ-

Table 2. Response to Each of Three Primary Outcomes for Yoga Participants

Group	6MW (ft)	DD	Total FPI
WLC	-134	4	-0.06
WLC	-4	0	-0.14
IY	-56	0	-0.09
WLC	-27	0	missing
IY	57	1	-0.11
WLC	77	0	-0.2
IY	35	0	-0.07
WLC	-23	2	0.09
WLC	-27	2	0.14
IY	-25	-0.5	0.2
IY	137	0	-0.28
IY	-35	-4	-0.03
WLC	-2	-2	-0.01
IY	29	-1	-0.15
IY	138	0	0.5
IY	234	0	0.62
IY	80	-1	0.25
IY	109	-0.5	0.47
IY	32	-4	0.57
IY	140	-6	0.11
IY	129	-1	0.21
WLC	137	-1	0.24

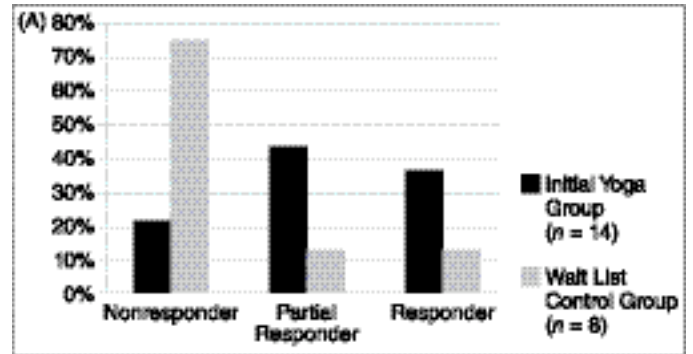
Note. White = nonresponder (no change or negative score); light gray = partial responder (improvement, but less than MCID); dark gray = responder (improvement of 6MW 120 ft; DD 1 point; FPI 0.3 point); numbers represent raw change scores from baseline to post yoga-training program. The first column shows the original group assignment of each participant; IY = randomized to the initial yoga group; WLC = randomized to the enhanced wait-list control group; these data reflect the response to participation in the yoga program. 6MW = 6-minute walk; DD = dyspnea distress; FPI = total functional performance; MCID = minimum clinically important difference.

ences also were found between the IY group and the WLC group in the percentage of participants categorized as DD responders (43% vs. 25%), partial responders (14% vs. 0%), and nonresponders (43% vs. 75%). Of the 4 participants who were classified as nonresponders in all 3 categories, 3 participants had been originally assigned to the WLC group. Of the WLC participants who completed the yoga program, 75% were classified as 6MW or DD nonresponders, and the majority of the IY participants who completed the yoga program were in the partial or complete responder categories for both 6MW and DD. No between-group differences in FPI were evident.

Changes in Health Outcomes Related to Responder Classification

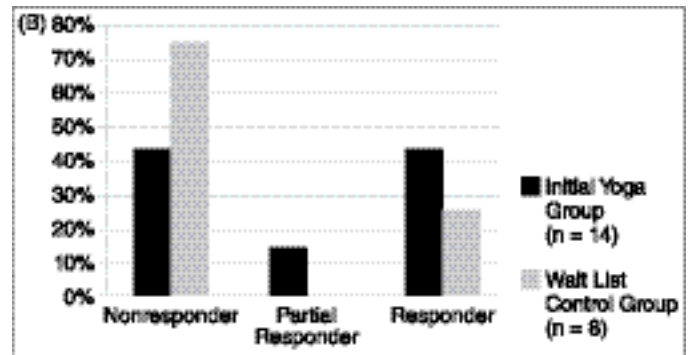
No significant pre- to postintervention differences were found between the 3 6MW distance responder groups for HRQL or psychological well-being. A significant difference among the 3 DD responder groups in state anxiety ($p < 0.001$) was detected, with the responder group reporting increased levels of anxiety (30.2 ± 3.8 to 38.1 ± 5.9) compared with the nonresponder group, which remained

Figure 2A. Comparison of percentage of 6-minute walk responders in the initial yoga group and the wait-list control group.



Note. For the 8 participants in the WLC group, these data reflect their response to participating in the yoga program.

Figure 2B. Comparison of percentage of distress related to dyspnea (DD) responders in the initial yoga group and the wait-list control group.



Note. For the 8 participants in the WLC group, these data reflect their response to participating in the yoga program.

unchanged (28.6 ± 7.8 to 28.1 ± 6.9 ; $p < 0.05$). The 2 participants in the DD partial responder group showed significant reductions in anxiety scores (39.5 ± 9.2 to 28.5 ± 6.4 ; $p < 0.05$), compared with the DD responder and nonresponder groups.

A significant difference in the physical function subscale on the SF-36 was found between the 3 FPI responder groups. The FPI responder group demonstrated significantly improved self-reported physical function (46.3 ± 15.5 to 49.6 ± 15.3 ; $p < 0.05$) compared with the partial (55.5 ± 24.6 to 42.9 ± 21.4) and nonresponder (56.8 ± 21.7 to 52.3 ± 18.4) groups.

During the semistructured exit interview, the 6 participants classified as responders for 2 of the 3 outcome variables reported improvements in sleep, posture, flexibility, exercise tolerance, pain, and decreased congestion following the yoga program. Those who were classified as partial or nonresponders on the basis of the data also noted benefits, including improved breathing and relaxation, increased tolerance for exercise, and increased mind-body awareness.

Baseline Characteristics by Responder Group

Although no statistically significant differences between responder groups were detected for any of the baseline characteristics measured, some interesting trends emerged. None of the participants who used oxygen evidenced MCIDs for 6MW distance, although all 3 participants who used oxygen improved their DD. 6MW and DD responders, as well as FPI nonresponders, reported a higher frequency of exercise at baseline. No patterns by responder classification for gender, age, educational level, or living situation were identified.

Discussion

Of the 22 individuals who completed the 12-week modified Iyengar yoga program, 18 demonstrated MCIDs for 1 or more of the outcome variables. All 22 participants, including the 4 who did not demonstrate any MCIDs, reported improvements in quality of life during a semistructured interview. Although all participants experienced objective and/or subjective improvement, the pattern of change was not associated with any baseline characteristics. The 6 participants classified as responders for 2 of the 3 outcomes (6MW, DD, or FPI) reported improved sleep, posture, flexibility, exercise tolerance, and pain level and decreased congestion following participation in the yoga program. Further, the 4 participants with no evidence of MCIDs for any of the outcome variables also reported benefits, including improved breathing and relaxation, increased tolerance for exercise, and increased mind–body awareness after the yoga classes.

Women were more likely than men to attend yoga classes in this study. Two-thirds of the group of males who originally enrolled did not complete the classes, compared with less than one-third of the female participants. No gender differences in outcomes were found, and both men and women reported subjective improvements. These findings support the assertions in the popular press that yoga has mental, physical, and psychological benefits for men as well as for women. Strategies for engaging male yoga students may include combining yoga with other forms of exercise to increase interest and variety, using informal language, and modifying the teaching approach.²⁴

An unexpected finding was that participants initially randomized to the IY group experienced more benefits from yoga than did those initially randomized to the WLC group. This was the case even though participants in both groups were subject to the same inclusion criteria, classes were taught using the same protocols by the same teachers, and there were no differences in baseline characteristics

between groups. The effect of random assignment to a WLC group on subsequent response to treatment has been studied in a meta-analysis of tinnitus distress, which found that the effects of waiting are highly variable but may have a small and significant influence on results.²⁵ Although the offer of a free yoga class at the conclusion of the initial control time period was helpful for retention of control subjects, it seems that after the delay of 3 months, many lost interest in attending the yoga class. Perhaps the WLC participants did not place as high a value on their class experience as did those originally randomly assigned to the yoga class, or the delay dampened their perceived value of the program. The experience of waiting may affect the participants' response to treatment in a way that has yet to be identified. Alternately, the initial outcomes-testing session may have artificially elevated the baseline scores used for this analysis and decreased the effect of the intervention for those initially in the WLC group.²⁵

Participants who decreased their DD increased their state anxiety, whereas participants who partially responded decreased their anxiety. This could be an artifact of the small sample size, or it could provide additional evidence that anxiety and distress are distinct constructs.²⁶ The differences we observed could be influenced by the context of assessment because DD was measured immediately after 6MW and state anxiety was measured during an assessment that included a battery of questionnaires.

There did not appear to be a pattern relative to responder outcomes. We had initially hoped to find baseline characteristics of a “responder phenotype,” a participant with COPD who consistently improved their 6MW distance, DD after the 6MW, and functional performance with daily activities. Instead, we found a wide variety of positive subjective and objective improvements after yoga participation that did not follow any identifiable pattern. We evaluated a possible ceiling effect of the 6MW responders and found that 4 of the 5 6MW responders had the 4 longest recorded 6MW distances at baseline. Even though they were well conditioned at baseline relative to their peers, improvements were detected, ruling out the possibility of ceiling effects. In contrast, the FPI responders had the lowest baseline FPI scores and the lowest endorsement of depressive symptoms. Because all participants reported subjective improvements and most participants showed some objective response, it is our opinion that yoga is a viable option to consider for most patients with COPD who are looking for self-management treatment options.

Limitations of this exploratory analysis include a small sample size and the possible lack of sensitive measures of physiological and psychological changes for this sample of participants with COPD. Miaskowski and colleagues⁸ successfully used a responder analysis to document the benefits

of treatment that were not evident using conventional comparisons between intervention and control groups. Our exploratory analysis identified a variety of specific benefits of yoga program participation but no universal themes among responder types. Subjective comments by the participants suggest that the yoga intervention was perceived as beneficial; however, these benefits are not reflected in our statistical analyses. Prevention and intervention researchers are continuously faced with the challenge of finding measures with the precision to detect treatment effects.²² Quantitative measures that are sensitive to change and responsive to the dimensions of complementary therapies may decrease the gap between subjective reports of improvement and quantitative test results in the future.²²⁻²³

Conclusion

Yoga may provide a viable self-management strategy for patients with COPD. Future studies with a larger sample size and recently developed physiological outcomes, such as continuous monitoring, real-time evaluation of dynamic hyperinflation, inflammatory biomarkers, and sensitive measures of change, will lend richness to the clinical evidence. Future research should explore the gender disparity in yoga class attendance and the distinctions between state anxiety and distress related to dyspnea. Participants who completed the yoga class unanimously voiced their appreciation for the program and its benefits. Further studies are needed to examine the mechanisms of action in yoga research so that we can better understand which approaches are most effective and for whom.

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Appendix A

Yoga Program for Patients with Chronic Obstructive Pulmonary Disease

Developed by the UCSF Dyspnea Research Group
Invited Expert Yoga Instructor Panel

Equipment needs:

- Sticky mat
- Blocks
- Bolsters
- Blankets
- Chairs
- Wall space
- Oxygen saturation monitor
- Blood pressure cuff
- Stethoscope

A registered nurse attended each session to monitor vital signs and oximetry prior to and after each session. The nurse participated in the yoga class and was available to assist the teacher and participants during the class as needed.

Introductory letter from yoga instructor and principal investigator:

Ask subjects to arrive 15 minutes before scheduled class time to take care of restroom needs, use of inhalers, etc. Wear loose, comfortable clothing and have bare feet. If going barefoot is not possible, speak with the instructor and provisions will be made. Yoga should be done on an empty stomach. Meals should be completed at least 2 hours prior to a yoga session. Let participants know that physical adjustments are made during each class sessions. If a subject is not comfortable with touch, they will be asked to inform the instructor about this at the first session.

Introductory session: first meeting

- Goal: create safe environment and set the tone of the class
- Introduction to the bones and the type of instructions used during a yoga class
- Hints and precautions for the practice of yoga asana will be discussed
- Subjects will be taught pursed-lip breathing and nasal breathing and will be encouraged to use pursed-lip breathing or nasal breathing during all poses. Have participants notice the thoracic changes that occur with nasal breathing that are harder to create with mouth breathing. Have them notice the decrease in heart rate, respiratory rate, and potential quietness that comes to the body with nose breathing. Have them notice the change in how they feel.

Asanas, with detailed instructions

1. Half Dog pose at the wall (*Adho Mukha Svanasana*) 5 breaths

Goal: to stretch the accessory muscles of respiration in the chest wall, improve flexibility in shoulder joints and thoracic spine.

- Put a sturdy chair against a wall. Place hands shoulder-width apart on the back of the chair (or directly on the wall 1–2 inches above hip level).
- Keeping the hands on the chair or wall, step the right foot back on the exhale. Again inhale, and on the exhale walk the left leg back.
- Keep the feet hip-distance apart and the feet right under the hips. Extend the arms. Extend the spine. 5 breaths.
- On each exhalation move the hips closer to the center of the room and move deeper into the pose.
- Variation will be shown for those with a rounded back. The hands will be raised up the wall.
- Taking the attention to the feet, spread the balls of the toes.
- Release the grip of the jaw.
- Release the tension in the forehead, eyes, etc.
- To come out of the pose, walk the feet forward toward the chair.
- Sit down in the chair for a few moments if you feel lightheaded or need to rest.
- Take a resting breath and repeat the pose.



2. Mountain Pose (*Tadasana*) 2 breaths

Goal: to stretch the thoracic spine

Stand erect with feet together and the heels and big toes touching each other. Lift the knee caps. Pull up the muscles at the backs of the thighs. Stretch spine upward, lifting sternum and collarbones. Hands are placed along the thighs, fingers stretched. Note: Tadasana can be done in sitting position if necessary.

Variations:

- Extend the arms over the head: catch wrist with the opposite hand and stretch sideways (standing or sitting). Hold position for 3 breaths, release hands to sides during exhale. Repeat with other hand and wrist. 3 breaths. Goal: to stretch intracostal muscles, spine, anterior chest
Back to neutral tadasana for 2 breaths
- Hands behind head. Be careful that the hands are on the skull and not the neck. Gently push head back against the hands and widen arms and elbows toward the back, chest lifting and opening (standing or sitting). 3 breaths



3. Triangle Pose (*Trikonasana*) done against a chair for support 5 breaths

Goal: to stretch the intracostal muscles and increase flexibility in the thoracic spine

- Stand with feet 3–4 feet apart on sticky mat, about a leg's length. Place right toes at 90 degree angle and left toes at 45 degrees.
- Exhale and bend the torso sideways to the left from the hip crease, not the side waist.
Modification: use a chair, placing the left hand on the seat or back of the chair, depending on the height needed. Breath should feel easy and unrestricted. Bring the left buttock slightly forward. Place the right hand on the right hip.
- As flexibility in the hips, hamstrings, and spine increases, move the left palm lower and press the left heel down on the floor.
- Adjust the posture until your weight rests on the left heel and not on the left palm.
- Raise the right arm up toward the ceiling in line with shoulders and left arm.
- Turn the head, keeping neck passive, and fix eyes on the right thumb. If the pose becomes uncomfortable in the neck, look straight ahead or to the floor.
- Stay in the posture for 20–60 seconds. Do not take deep breaths, but breathe evenly.
- Focus awareness on four aspects of chest movement: front, back, lateral, rib cage.
- Ground the feet and legs. With strong legs and strong right arm, inhale and come out of the pose.
- Repeat on the other side.



4. Cobra Pose (*Bhujangasana*) Move to the floor, lying on the belly 5-10 breaths

Goal: to stretch the anterior muscles of respiration and improve flexibility in the thoracic spine

- Lie prone on the blanket, keeping the legs together, chin touching the ground, gaze downward, soles of the feet facing up. Stretch the hands straight forward alongside the head with palms facing each other.
- Bring the arms back to the level of the last rib bone. Palms are flat on the floor by the last rib bones. Keep the arms bent at elbows; least pressure to be exerted on the hands. Maintain the elbows touching the body; do not let the arms spread out.
- Raise the head first and then the upper portion of the trunk slowly, just as the cobra raises its hood, till the navel portion is about to leave the ground. Arch the dorsal spine well. Keep the body below the navel and the pelvis on the ground.
- If necessary, modify pose by standing in front of a chair.

5. Supported Bridge Pose (*Salamba Setu Bandhasana*—modified) 15 breaths

Goal: to stretch the anterior muscles of respiration and improve flexibility in the thoracic spine, and to calm the nervous system. A combination of gentle supported backbend and mild inverted position.

- Support using a bolster under the back and one at the feet, with the feet placed at the wall.
- Sit down on the folded blankets or position yourself near the end of the support so when you lie down your head is near the far end. Use the support of arms to lie down. Slowly slide off the end until the head and shoulders rest flat on the floor. Legs can be supported by adjusting blankets so feet are touching a wall.
- Relax the throat and chin. Lengthen and release the neck. When you feel comfortable, close your eyes and cover them (eye bags). Relax the arms out to the side at a comfortable angle.

6. Simple Twist (*Bharadvajasana*) 5–10 breaths

Goal: to stretch and strengthen the intracostal muscles and improve flexibility of the vertebral column

- Sit sideways on the floor with the right buttocks cheek on a blanket and the right hand on top of the left arm.
- Lift the rib cage, stretch the shoulders back and down, and lengthen the spine upward.
- Turn to bring the left side of the body around and turn the right side forward. Keep the upper body stretching toward the ceiling as you turn to the maximum. Turn the head slowly and look over the shoulder.
- Inhale while extending the spine, exhale while twisting deeper.
- Continue twisting for several more breaths, exhale as you come back to the center, pause for a moment, sitting tall.
- Repeat on the left side.

7. Staff Pose (*Dandasana*) 3 breaths

Goal: to release the back of the legs and extend the spine

- Extend legs one at a time
- Lengthen the heels and spread the balls of the feet
- Place the hands on the floor to the outside of the hips
- Straighten the arms and extend the spine.



8. Bound Angle Pose (*Baddha Konasana*) 5–10 breaths

Goal: to teach a sitting position in which the chest is open and to improve flexibility of the hips for general mobility

- Use blankets rolled at the wall and placed under the knees for beginning students. For those with stiff rounded backs, the wall can be used for support.
- Sit on the floor with legs stretched out. Keep thighs, knees, and ankles together. Bend the right knee and hold the right ankle and heel with both hands. Draw the right foot toward the groin. Keep the left leg straight, resting on the floor.
- Bend the left knee the same way as the right knee. Pull the left foot toward the groin until the soles of both feet touch each other. Hold the feet firmly in near the toes with both hands
- Stretch the spine, widen the thighs. Gently press the heels together to lengthen the inner thigh. As this occurs, the knees will move toward the floor. Look straight ahead.

9. Child's Pose (*Balasana*)

Goal: to stretch the lower back and increase awareness of breathing in the back

- Kneel on padded surface with the feet and knees about hip width apart and bolster or folded blankets placed lengthwise in front of the body. Modify by placing two bolsters in a T shape if needed.
- Point the toes directly behind you, keeping the feet in line with the calves. Slowly lower your bottom toward the heels on the exhale.
- Separate knees widely enough to place the bolster between the thighs. Allow your bottom to move back toward the heels, which extends the lower back.
- Turn the head to the side. Relax the chin. Turn the head to the other side half way through the pose. Breathing should feel easy and relaxed. Become aware of the breath in the back body. Noting the inhale and exhale 3 breaths with head facing right and 3 breaths with head facing left.
- To come out of the pose, place the palms on the floor under the shoulders. Inhale, press the arms into the floor and sit up slowly onto the knees. Then bring one leg and then the other forward in an extended position, taking 3 breaths in Dandasana.



10. *Savasana* with chest elevated for 15 minutes. This includes the gradual inclusion of *sama vritti pranayama* (same length inhale and exhale) and *visama vritti* (short inhale, long exhale) *pranayama*. Ten minutes will be spent in pranayama practice, followed by five minutes of complete savasana with chest on the floor and a blanket under the head and neck for support.

Goal: to teach the art of relaxation and improve respiratory function and to improve the student's confidence in his/her breathing

- Sit on the floor with the legs straight out in front. Lean back on the elbows and adjust the torso or legs so that the chin, center of the chest, navel, and pubic bone extend directly toward a center point between the heels.
- Lower the back slowly to the floor. Allow the back to sink toward the floor. Bolster may be placed under knees, one blanket under the head and one blanket under the chest.
- Turn the upper arms out, slightly away from the trunk, palms up. Extend the arms out of the shoulders, then allow them to relax. Soften the hands, allowing fingers to curl naturally.
- Extend the legs and feet. Allow them to drop toward the floor and fall evenly away from the midline. Soften the toes.
- Close your eyes. Relax the lips and tongue. Let the lower jaw be loose, lips barely touching, tongue passive. Allow the mouth to feel as if you are about to smile. Feel the face muscles soften and relax. Let the eyes sink down in their sockets. Allow the body to release and sink toward the floor.
- As you lie still, let your mind follow your breath. Quietly observe the peaceful in-and-out flow of your inhalation and exhalation. Listen to the beat of your own heart. Each time your mind starts to wander into the past or future, bring your awareness back to the breath.
- Stay lying still for about 5 or 10 minutes. Let go of the past. Become "dead" to the old and prepare the way for something new.
- Supporting the length of your spine and back of the head with firmly folded blankets opens the chest and allows the breath to flow freely; this is especially beneficial to people with respiratory problems.



At the final bell signifying the end of Savasana, participants were encouraged to slowly and gently come back to awareness and shift to a sitting position. The class ended with Namasté. At the conclusion, the registered nurse checked vital signs, oxygen saturation, dyspnea, and discomfort/pain prior to dismissing the class.

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Research

Pain Uncertainty in Patients with Fibromyalgia, Yoga Practitioners, and Healthy Volunteers

David H. Bradshaw, PhD, Gary W. Donaldson, PhD,
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Abstract:

Background: Uncertainty about potentially painful events affects how pain is experienced. Individuals with fibromyalgia (FM) often exhibit anxiety and catastrophic thoughts regarding pain and difficulties dealing with pain uncertainty. **Objectives:** The effects of pain uncertainty in predictably high odds (HO), predictably low odds (LO), and even odds (EO) conditions on subjective ratings of pain (PR) and skin conductance responses (SCR) following the administration of a painful stimulus were examined for individuals with fibromyalgia (IWFM), healthy volunteers (HVs), and yoga practitioners (YPs). We hypothesized IWFM would demonstrate the greatest physiological reactivity to pain uncertainty, followed by HVs and YPs, respectively. **Methods:** Nine IWFM, 7 YPs, and 10 HVs participated. **Results:** Custom contrast estimates comparing responses for HO, LO, and EO pain conditions showed higher SCR for IWFM ($CE = 1.27, p = 0.01$) but not for HVs or for YPs. PR for the EO condition were significantly greater than for HO and LO conditions for IWFM ($CE = 0.60, p = 0.012$) but not for HVs or YPs. YPs had lower SCR and PR than did HVs. **Conclusions:** Results show that uncertainty regarding pain increases the experience of pain, whereas certainty regarding pain may reduce pain ratings for individuals with fibromyalgia.

Key Words: pain, fibromyalgia, yoga, uncertainty, cognitive-behavioral therapy

Introduction

Fibromyalgia (FM) is a chronic condition characterized by widespread pain. It is often accompanied by functional and mood disorders, including anxiety,^{1,2} cognitive dysfunction,³ and catastrophizing.⁴ Individuals with FM often note the unpredictable nature of the severity of their symptoms and report that this unpredictability significantly compromises their quality of life.⁵ Uncertainty about life events can have profound psychological and physiological effects, including increased anxiety⁶ and physiological arousal.⁷ These effects may be more pronounced in people who tend to be anxious or intolerant of uncertainty.⁸ This study exam-

ined differential responses to painful stimuli in high, low, and uncertain (even odds) pain conditions for individuals with fibromyalgia (IWFM), healthy volunteers (HVs), and yoga practitioners (YPs).

Pain uncertainty may have a significant impact on the experience of pain. Recent findings suggest that the unpredictability of a potentially painful impending event can influence the intensity of experienced pain,⁹ with increased pain sensitivity,¹⁰ enhanced activation of pain-associated brain regions,⁹ and increased allodynia (the perception of normally nonpainful stimuli as painful)¹¹ being noted. High pain-related anxiety tends to reduce tolerance for uncertainty.¹² However, when reliable information regarding a partic-

ular event is provided such that an individual can anticipate the possible outcome, pain may be reduced.¹³

Brain imaging studies have shown that an individual's certainty and uncertainty regarding pain activates different brain regions,^{9,14} with amount of activation being influenced by the level of anxiety.¹⁵ When provided information about an impending noxious event, however, individuals can generate cognitive appraisals to anticipate and prepare for the experience. In the absence of information, affective processing is more likely to transpire, which can exacerbate subjective experiences of pain.¹⁶

The relation between uncertainty and increased arousal is particularly potent for individuals prone to anxiety. Though individuals with FM have been shown to have high levels of anxiety, the associations between anxiety, increased arousal, intolerance of uncertainty, and the experience of pain have not been explored.

Yoga and meditation have been used to manage pain and related conditions, including anxiety and depression.^{17,18} These practices are associated with a number of health benefits, including improved cognitive function and emotion regulation,¹⁹ enhanced autonomic nervous system function,^{20,21} and decreased sensitivity to noxious stimulation.^{22,23} A recent systematic review of research on mind–body modalities found these methods to be effective for managing FM-related pain.²⁴ An examination of 177 women with FM undergoing an 8-week course in mindfulness-based stress reduction (MBSR) found a modest reduction in anxiety, but none for pain ratings or health-related quality of life indicators.²⁵ A study of 53 individuals with FM found sizable reductions in pain and other symptoms following an 8-week trial that included a treatment that combined yoga, meditation, and education.²⁶ This suggests that a strategy that combines yoga and meditation may be more effective than MBSR alone.²⁷

Most studies of yoga evaluate treatment effects following short (8–12 weeks) or intermediate (3–6 months) periods. Few have evaluated the benefits of long-term yoga use. A recent study of women practicing yoga for 2 or more years noted lower scores for mood disturbance, anxiety, and anger-hostility for the practitioners than for age-matched women who did not practice yoga.²⁸ It is possible that the benefits seen in individuals with FM could be enhanced by long-term practice.²⁸ Whether long-term yoga practice reduces susceptibility to the effects of uncertainty about pain remains unclear.

This study had 3 objectives: (1) to examine the effects of uncertainty (HO, LO, and EO) on pain perception; (2) to compare differences in pain perception for individuals with FM (IWFMs), generally healthy volunteers (HVs) who did not practice yoga, meditation, or related activities, and long-term yoga practitioners (YPs); and (3) to provide preliminary

data for future studies addressing potential uses of yoga and meditation for managing pain in FM that specifically targeted the mediating effects of uncertainty on pain and anxiety. We hypothesized IWFMs would demonstrate the greatest physiological reactivity and self-reported pain in response to uncertainty, followed by HVs and YPs, respectively.

Methods

Participants

Participants provided informed written consent prior to the study, as stipulated in the research protocol approved by the University of Utah Institutional Review Board. Nine women with FM (IWFMs) were recruited from local pain clinics, and 7 YPs and 10 HVs enrolled in the study. Group sizes were based on a prospective power analysis (see Data Analysis section for details). Because individuals with FM are predominantly female, the entire study sample was limited to women.

Women with physician-diagnosed FM were assessed in our laboratory by means of the standard tender point (TP) examination and self-reported body pain, according to the American College of Rheumatology classification criteria.² Recent findings show individuals with FM often engage in limited physical activity.^{29,30,31} To control for baseline group differences in physical conditioning, we selected only IWFMs who were capable of engaging in regular exercise. IWFMs participants did not practice yoga, meditation, or other mind–body activities, however.

HVs were recruited through advertisements on campus and in the community. Individuals were required to be in good health without chronic pain, have no activity restrictions, and not be engaging in yoga or meditation. Persons with a history of heart disease, hypertension, seizure disorder, multiple sclerosis or other nervous system condition, diabetes, or those using psychoactive or blood pressure medication were excluded from the study.

YPs were free of chronic pain and had practiced yoga regularly for 3 or more years prior to enrollment. Participants practiced yoga 3 or more days a week for at least 1 hour a day and engaged in vigorous physical, breathing, and meditation exercises in their regular practice. We recruited YPs who practiced Kundalini yoga as taught by Yogi Bhajan³² because this tradition uses standardized techniques.³³ Practices include a short “tuning in” chant followed by stretching, breathing, relaxation, and meditation, and conclude with an affirmation song and/or chant. Lengths of each segment vary, but typical sessions last 60 to 90 minutes.³⁴ YPs were recruited from contacts with local Kundalini yoga instructors.

Measures

Pain ratings. Pain ratings were obtained using an 11-point numerical rating scale (NRS) with 0 indicating no pain and 10 indicating the maximum tolerated pain.

FM-related symptoms. All subjects completed the Fibromyalgia Impact Questionnaire (FIQ). The FIQ measures 7 factors related to FM, including pain, fatigue, anxiety, depression, morning stiffness, awakening unrefreshed, and disability.³⁵ The psychometric properties of the FIQ have been well reviewed,³⁶ and the instrument can be used successfully with non-FMS populations.³⁷

Anxiety. The 40-item State-Trait Anxiety Inventory³⁸ assesses current state (STAI-State) and enduring or trait anxiety (STAI-Trait). Its psychometric properties have been well validated in patient and healthy populations.^{39,40}

Catastrophizing. The catastrophizing subscale of the Coping Strategies Questionnaire (CSQ)⁴¹ was used to assess catastrophizing as a measure of the degree to which pain is thought of as overwhelming and unendurable. The psychometric properties of the CSQ are well documented.⁴²

Skin conductance. Changes in skin conductance response (SCR) provide an indicator of increased sympathetic nervous system activity in response to pain and associated arousal.^{43,44} We measured SCR using 2 silver-silver chloride electrodes placed on the palmar surface of the medial phalanx of the index and ring fingers on the dominant (nonstimulated) hand. SCR electrodes passed a low current (1 Amperes) through the skin surface and recorded fluctuations in skin conductance using signal conditioning amplifiers (BioSemi, B.V., Amsterdam, Netherlands) and signal acquisition software developed in house using LabView (National Instruments Corporation, Austin, TX).

Pressure stimulation. To deliver noxious and innocuous stimulations, we used a pneumatic pressure algometer that applied constant pressure to the nail bed of the thumb on the nondominant hand. Participants placed their thumbs on a small, flat platform attached to a handgrip. A round, flat-tipped plunger 3 mm in diameter was positioned directly over the thumbnail. A system of pressure-limiting valves controlled the pressure level applied, allowing for a gradual increase in pressure. This system facilitated precise pressure-level measurement, delivering constant pressure at 3 different repeatable pressure levels. This provided square wave patterns of sustained pressure and release. This algometer produces an aching sensation that becomes increasingly painful as pressure increases.

We established individual pain thresholds and 3 pressure levels for testing. Pressure was gradually increased until participants indicated they began to feel pain. We continued increasing pressure until they reported pain of 6 on the NRS. This process was repeated 2 times. An individual's

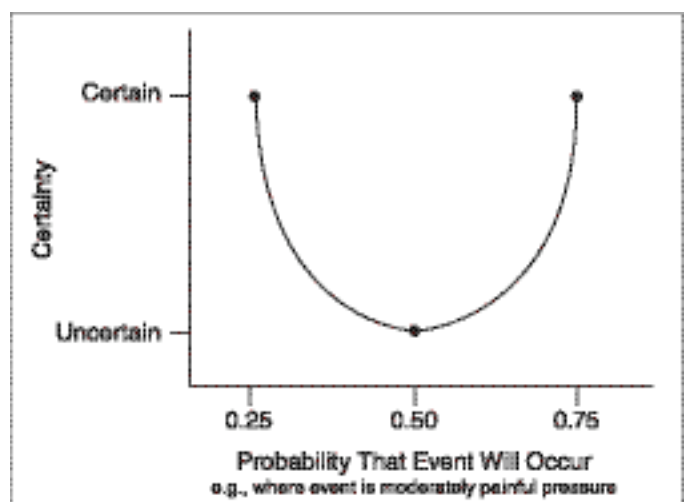
pain threshold was computed as the average of the 3 pressure levels.

Three stimulus levels were then established: very low pressure (no pain) set at 20% below the individual's pain threshold, low pressure (low pain) set at pain threshold, and high pressure (moderate pain) set at the average level corresponding to the individual's pain rating of 6. This procedure was performed independently for each participant to determine the pressure levels required to produce moderate and low pain. After setting the pressure levels, we verified that they produced pain ratings that corresponded to the desired NRS levels.

Manipulation check on pain expectation. Following each block of stimulations, participants rated whether the pain just experienced was more than, less than, or the same as expected.

Certainty/uncertainty conditions. Previous investigations of pain anticipation and certainty/uncertainty have used either continuously varying^{15,45} or discrete manipulations^{14,46} of certainty and uncertainty. In the first method, participants were told that a painful stimulus might happen at any time and the more time that elapsed, the more intense the stimulus would be. As such, the certainty of pain increased and uncertainty decreased over time. In the second approach, the probability of receiving a painful stimulation was given immediately prior to each stimulus delivered. Neither approach satisfied our protocol requirements, because the first did not allow for clearly distinguished conditions of certain and uncertain pain and the second could introduce phasic changes in SCR as an artifact of the instruction rather than as an effect of condition.

Figure 1. 1 Illustration of the curvilinear relationship between probability and certainty/uncertainty.



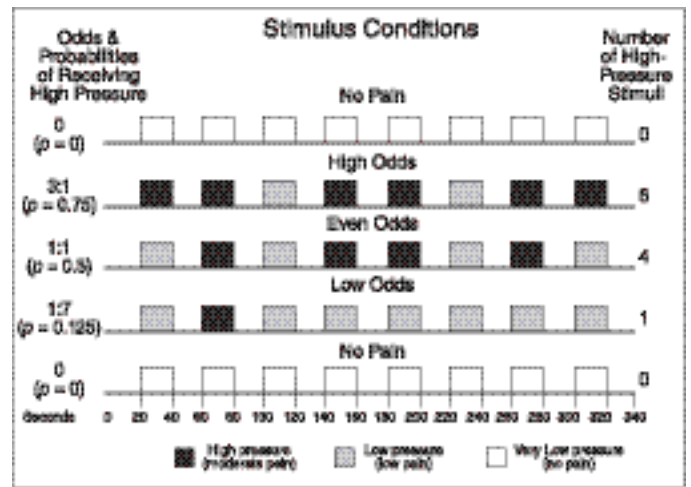
Consequently, we developed and used an alternative approach based on uncertainty theory⁴⁷ that allows for continuous anticipation of pain while maintaining experimental control over the relative certainty or uncertainty of stimulus intensities. The relationship between probability and certainty/uncertainty varies along a U-shaped curve (Figure 1). A condition of certainty holds when the odds (probability) of an event's occurrence are either very high (HO; for example, $p > .75$) or very low (LO; for example, $p < .25$). When the odds of occurring are high there is strong certainty the event will occur. When the odds of occurring are low, there is strong certainty the event will not occur. A condition of uncertainty holds when the odds that an event will occur are about equal to odds that it will not (EO: $p = .50$).

We operationalized this association between the odds of certainty/uncertainty in our experimental protocol by using 2 levels of stimulus intensity: low pressure (slightly painful) and high pressure (moderately painful), presented in sequences of 8 stimuli during which the odds of receiving a high pressure stimulus during any given sequence were varied (Figure 2). In the LO condition, only 1 high-pressure stimulus out of 8 stimuli was delivered (1:7 odds; $p = 0.125$). In the HO condition, 6 high-pressure stimuli out of 8 occurred (3:1 odds; $p = 0.75$). In the even odds (EO) condition, an equal number of high- and low-pressure stimuli were administered (1:1 odds; $p = 0.5$). The EO condition had maximal uncertainty, whereas the HO condition had maximal certainty for high pressure (painful) and the LO condition had maximal certainty for low pressure (non-painful) stimuli, respectively (EO, HO, and LO). Before each block, we informed participants of the likelihood of receiving high pressure during the block. Although in actuality participants received 1, 4, and 6 high-pressure stimuli in each condition, respectively, to maintain the expectation of a possible high-pressure stimulation to the end of the sequence, participants were told they may receive 1 additional high-pressure stimulation.

To ensure that participants understood the manipulation, each subject underwent uncertainty training prior to testing. This consisted of picking colored marbles from a bag, with marble colors corresponding to the number of high- and low-pressure stimuli in each condition. Subjects practiced each condition until they correctly identified the corresponding stimuli for that condition. This typically required 1 repetition per condition.

Condition order was randomized across subjects. To allow participants to adapt to experimental conditions and to provide a response baseline, a control block of nonnoxious stimuli (8 stimulations at subpain threshold pressure) was given before and after the 3 experimental conditions. Participants received a total of 5 stimulus blocks, totaling 40 stimulations: 16 control and 24 experimental (Figure 2).

Figure 2. Sequences of stimuli delivered during testing. Stimulus conditions vary according to the odds of receiving high pressure.



Note. High odds = high odds of receiving high pressure; even odds = even odds of receiving high and low pressure; low odds = low odds of receiving high pressure.

Procedures

After providing informed consent, individuals with FM underwent a TP examination.⁴⁸ A trained project coordinator digitally palpated 18 American College of Rheumatology (ACR)-determined TPs and 3 control points in a predetermined order at 4 kg force, at the rate of 1 kg/sec. Following each palpation, patients rated the pain from 0 (*no pain*) to 10 (*worst pain*). All patients met the ACR criterion of having at least 11 positive TPs. The widespread pain assessment was performed using the Manual Tender Point Survey instrument.²⁴

Prior to testing, participants completed the self-report inventories, received procedure instructions, and had sensors for psychophysiological measurement attached. The test procedure consisted of 2 phases. Participants' individual pain thresholds were established, and uncertainty training was conducted in Phase 1. Phase 2 comprised presentation of stimulus blocks. Stimulus trials included a 20-second rest period (pressure off) and a 20-second application of continuous and constant pressure (pressure on). Participants rated their pain after pressure release on each trial. At the end of each block, participants provided a pain expectation rating.

Data Analysis

Optimal sample size was determined using a prospective power analysis. Criteria included requiring 80% power to detect a difference of 1 unit on an 11-point pain rating scale in the certainty/uncertainty conditions between any 2 groups at an alpha of 0.05. With 8 repeated trials per condition, the effective sample size increased relative to unrepeated designs,⁴⁹ and specific computations consistent with

the analytic method yielded target sample sizes of 8 individuals per group.

Step 1 comprised an evaluation of pain threshold differences between IWFM, HV, and YP groups. A general linear model with pressure at pain threshold as the dependent measure and group as the fixed effect was used. Phase 2 data were analyzed using mixed effects linear models, with stimulus level and pain certainty/uncertainty as manipulated within-subjects fixed effects and group association as a non-manipulated fixed effect. The CSQ scale, STAI-Trait, and STAI-State were treated as primary covariates in the analysis accounting for individual variation in anxiety and catastrophizing. Contributions of descriptive measures, including BMI and age, and FMS symptom measures were treated as secondary covariates.

We predicted subjects' SCR, pain reports, and expectancy measures by applying the following analytical model expressing a measure of subject i and combined fixed effects conditions j on dependent variable Y as: $\hat{Y}_{ij} = \mu_j + \gamma_i + \beta_{1j}(CSQ)_i + \beta_{2j}(STAI)_i$ in which μ_j represents the expected cell mean j conditional on the covariates, γ_i represents individual differences (random effects) across subjects, and β_1 and β_2 are the cell-specific regression coefficients for the covariates. This model permits the usual analysis of variance hypothesis tests, including between-groups comparisons on each measure and intervention comparisons, as well as evaluation of within-subject repeated measures.

Models were evaluated with all fixed effects factors and interactions included and with the error structure providing the most parsimonious fit as determined by the Bayesian Information Criterion (BIC). The joint effects of the covariates were evaluated by likelihood ratio test among models with no covariates, linear covariates, and covariate-by-factor interactions. Contrasts among the model parameters were constructed to test custom a priori hypotheses regarding the differential effects of certain and uncertain pain expectation within and between groups at each stimulus level and across stimulus levels. All contrasts were evaluated at the means of significant covariates.

Results

Groups differed for age, body mass index (BMI), and exercise (Table 1). HVs were younger than those in the other 2 groups. IWFM had the highest BMI, and persons who were YPs exercised the most. The IWFM group had significantly higher catastrophizing scores than did HVs ($p = 0.016$) and YPs ($p = 0.003$). Pair-wise group comparisons for the FIQ factors revealed IWFM had significantly higher scores than did HVs and YPs for all components except fatigue. Although main effects for anxiety were not significant, pair-

Table 1. Comparison of Groups for Descriptive Characteristics, Catastrophizing, Fibromyalgia Impact Questionnaire, Anxiety, and Pain Threshold

Group	FM		HV		YOGA		Group Comp. $p <$
	Mean	SD	Mean	SD	Mean	SD	
Age	37.0	13.0	24.4	8.8	45.4	16.2	0.000
BMI	32.7	6.7	22.2	2.6	21.0	1.9	0.000
Exercise (hours/week)	3.0	.96	4.1	1.3	9.6	5.3	0.000
Sleep(hours)	7.4	7.3	6.9	.93	6.8	1.2	NS
CSQ-Cat	7.38 ^{bc}	4.60	3.13 ^a	2.64	1.50 ^a	1.80	0.007
FIQ							
Pain	4.69 ^{bc}	1.99	0.88 ^a	0.84	0.97 ^a	0.74	0.000
Fatigue	5.95 ^c	2.94	4.16	3.21	2.90 ^a	3.04	0.177
Awaken unrefreshed	6.26 ^{bc}	2.63	3.55 ^a	2.85	2.10 ^a	1.67	0.012
Morning stiffness	5.73 ^{bc}	1.94	2.16 ^a	2.45	0.97 ^a	0.98	0.000
Anxiety	5.09 ^{bc}	3.08	1.26 ^a	2.14	0.91 ^a	1.27	0.002
Depression	3.60 ^{bc}	3.02	0.91 ^a	1.74	0.83 ^a	1.07	0.022
STAI-Trait	34.63 ^c	11.58	28.80	6.83	24.86 ^a	5.79	0.103
STAI-State	37.87 ^c	8.18	33.89	6.33	30.14 ^a	4.95	0.105
Pain threshold (pounds/in ²)	4.35 ^c	2.03	6.05	2.31	7.94 ^a	3.54	0.032

^a Pair-wise comparison with FM was significant ($p < 0.05$).

^{a*} Pair-wise comparison with FM was borderline significant ($p = 0.07$).

^b Pair-wise comparison with HV was significant ($p < 0.05$).

^c Pair-wise comparison with YP was significant ($p < 0.05$).

^{c*} Pair-wise comparison with YP was borderline significant ($p = 0.07$).

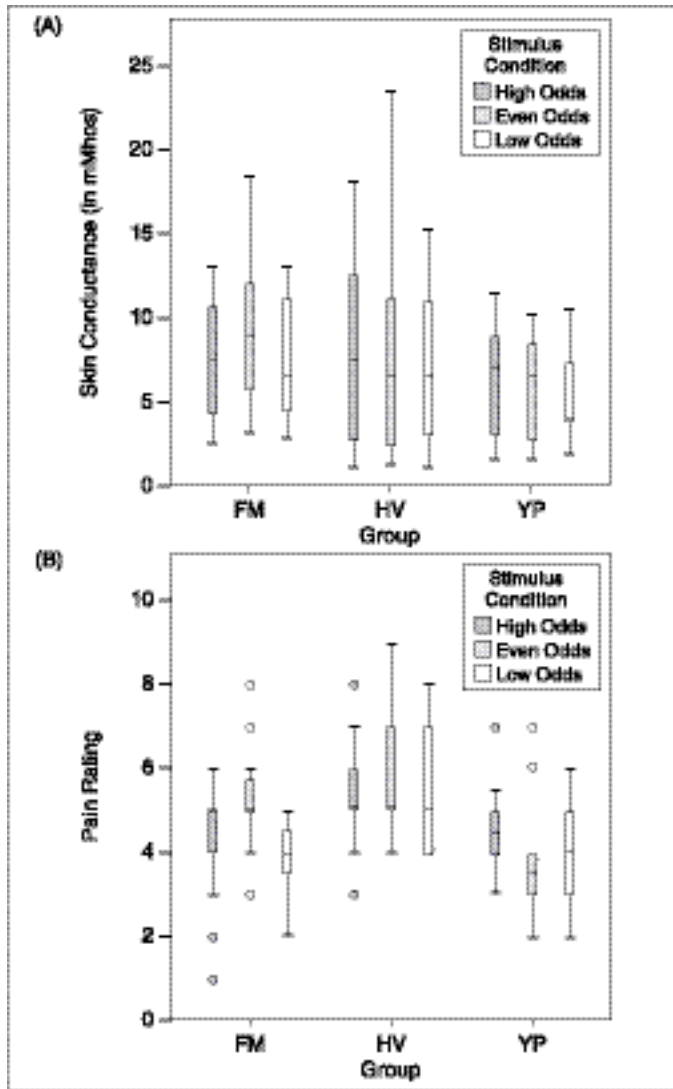
FM = fibromyalgia; HV = healthy volunteers; YP = yoga practitioners; SD = standard deviation; NS = nonsignificant; CSQ-Cat = Coping Strategies Questionnaire-Catastrophizing; FIQ = Fibromyalgia Impact Questionnaire; STAI = State-Trait Anxiety Inventory. Comp. = comparison

wise group comparisons revealed significant differences between IWFM and YPs for trait ($p = 0.036$) and state ($p = 0.035$) anxiety, but not between IWFM and HVs or HVs and YPs. YPs had significantly higher pain thresholds on average than did IWFM ($p = 0.010$). The mean pain threshold for HVs fell between that of IWFM and YPs, but did not significantly differ from either group.

Box plots reveal the value distributions for skin conductance (Figure 3A) and pain ratings (Figure 3B) in response to high-pressure stimulation by group at each certainty/uncertainty level. SCR and pain ratings for IWFM were highest for the EO condition, and the highest values for both HVs and YPs were found for the HO condition. HVs had considerable individual variation in values on both measures, particularly for the EO condition, indicating high group heterogeneity.

A mixed-effects model evaluating SCR change applying fixed effects for group, condition, and stimulus, and the

Figure 3A and 3B. Group variation in skin conductance response (Panel A) and pain ratings (Panel B) to high-pressure stimulation under varying conditions of pain certainty/uncertainty.



Note: FM = patients with fibromyalgia, HV = healthy volunteers, YP = yoga practitioners. High odds = high odds of receiving high pressure; even odds = even odds of receiving high and low pressure; low odds = low odds of receiving high pressure.

interactions, with random intercepts, trials within condition as repeated effects, and an autoregressive covariance structure, provided the best fit to the data. Primary and secondary covariates did not contribute significantly to the model. Table 2 provides model estimated marginal means and standard errors for SCR for the Group x Condition x Stimulus interaction. Figure 4A shows the pattern of mean SCR responses, adjusted for all other effects, for IWFM, HVs, and YPs for the 3 stimulus conditions. If participants responded more to a calculated number of high-pressure stimuli delivered during an experimental sequence, their

Table 2. Skin Conductance and Pain Ratings Responses to Pressure Stimulus by Group, Stimulus Level, and Condition, Adjusted for All Other Effects in the Model

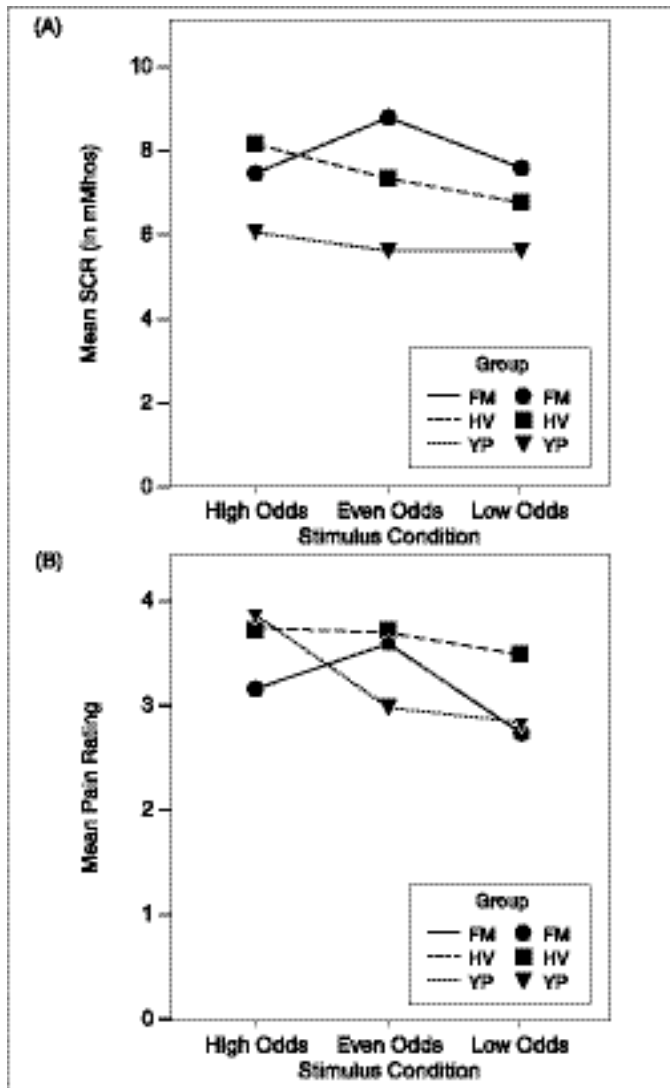
Group	Condition	Stimulus Level	Skin Conductance			Pain Ratings		
			Est. Mn Response (mMhos)	SE	df	Est. Mn Rating	SE	df
FM	High Odds	Low	7.465	1.406	25.476	1.783	.374	62.074
		High	7.501	1.407	25.533	4.530	.331	38.971
	Even Odds	Low	8.595	1.404	25.285	1.935	.365	56.251
		High	9.011	1.413	25.946	5.311	.354	50.560
	Low Odds	Low	7.685	1.403	25.258	1.681	.338	41.347
		High	7.480	1.427	26.967	3.842	.447	118.018
HV	High Odds	Low	8.097	1.332	25.893	2.009	.352	74.564
		High	8.043	1.331	25.822	5.524	.297	39.171
	Even Odds	Low	7.030	1.330	25.808	1.691	.333	59.546
		High	7.679	1.336	26.225	5.715	.316	50.002
	Low Odds	Low	6.721	1.334	26.051	1.611	.317	48.951
		High	6.777	1.353	27.612	5.372	.401	119.281
YP	High Odds	Low	5.980	1.623	25.379	3.095	.517	142.286
		High	6.107	1.626	25.609	4.633	.357	40.261
	Even Odds	Low	5.512	1.621	25.274	2.178	.456	95.892
		High	5.616	1.634	26.078	3.830	.389	55.696
	Low Odds	Low	5.588	1.621	25.290	1.838	.476	98.420
		High	5.569	1.643	26.657	3.852	.448	90.940

Note. Est. Mn=Estimated Mean; SE = standard error; df= degrees of freedom (Satterthwaite approximations). Groups: FM = fibromyalgia; HV = healthy volunteers; YP = yoga practitioners. Conditions: High Odds = high odds of receiving high pressure; Even Odds = equal odds of receiving high and low pressure; Low Odds = low odds of receiving high pressure. Levels: High = high pressure titrated to the individual participant's pain rating of 6 (0-10 scale); Low = low pressure titrated to 10% above the individual participant's pain threshold.

SCR responses should show a linear trend having its high point at HO (more high- than low-pressure stimuli), mid-point for EO (equal numbers of high- and low-pressure stimuli), and low point for LO (more low- than high-pressure stimuli). If participants responded more to the effects of uncertainty, SCR responses should show a nonlinear pattern, with the highest response occurring for the EO condition.

We found a nonlinear pattern for IWFM but a linear response for the other 2 groups. HVs responded most to HO (most high-pressure stimuli) and least to LO (fewest high-pressure stimuli). YPs responded most for HO, but the differences between conditions were very slight. We constructed custom hypothesis tests forming contrast estimates (CEs) to evaluate these apparent differences within and between groups. Comparing EO with HO and LO for each group revealed a significant difference only for the IWFM group (CE = 1.27, $p = 0.01$). Only IWFM responded more to uncertain (EO) than to certain (HO or LO) pain. For HVs, SCR was significantly greater for HO than for LO (CE = 1.32, $p = 0.02$). SCR for YP did not differ significantly between any of the 3 conditions. A further comparison evaluated the size of the effect of uncertainty for each group compared with the other groups. This contrast compared EO with HO, and LO combined both within and

Figure 4A and 4B. Group differences in estimated mean skin conductance response (Panel A) and pain ratings (Panel B) to high-pressure stimulation under varying conditions of pain certainty/uncertainty, adjusted for all other effects in the model.



Note. Error bars represent mean standard errors of measurement obtained for all contrast estimates tested. FM = patients with fibromyalgia, HV = healthy volunteers, YP = yoga practitioners. High odds = high odds of receiving high pressure; even odds = even odds of receiving high and low pressure; low odds = low odds of receiving high pressure.

between groups. These comparisons revealed that IWFM and YPs differed significantly ($CE = 1.742, p = 0.032$), and the difference between IWFM and HVs approached significance ($CE = 1.252, p = 0.088$).

For pain ratings data, a mixed-effects model using fixed effects for group, certainty/uncertainty condition, and stimulus level, and their interactions, with trials as repeated effects and a random intercept, provided the best fit. Inclusion of the CSQ and STAI-Trait covariates slightly improved prediction of pain rating ($p < .001$ main effects, p

$< .001$ Linear \times Factor interactions). No additional covariates made significant contributions. Table 2 provides estimated marginal means for pain ratings (PRs) for the Group \times Condition \times Stimulus Level interaction conditioned on the significant covariates. The pattern of adjusted mean PR for IWFM shows higher values for the EO condition and considerably lower values for both HO and LO (Figure 4B). HV PRs appear higher overall compared with those of the other groups, with a slight linear decrease from HO through EO to LO. YP PR ratings appear highest for HO but considerably lower for both EO and LO conditions. Custom hypothesis tests showed IWFM PRs were significantly higher for the EO than for HO and LO conditions ($CE = 0.60, p = 0.012$). This was not the case for HVs or YPs. HO pain ratings were significantly greater than LO for YPs ($CE = 1.24, p = 0.006$) but not for HVs. The comparison of the within- and between-group effects of uncertainty for pain ratings revealed that IWFM and YPs differed significantly ($CE = 1.001, p = 0.004$) and IWFM and HVs differed marginally ($CE = 0.557, p = 0.059$).

Discussion

Our results provide preliminary evidence that uncertainty about the severity of painful stimulation increases psychophysiological responses and reported pain in individuals with FM but not in YPs or in HVs. For IWFM, the highest mean SCR levels and pain ratings occurred when the number of high- and low-pressure stimuli were equal (EO) and therefore unpredictable. Unpredictability of pain did not increase physiological responses or pain ratings in YPs or HVs. Rather, their responses corresponded more to the number of high-pressure stimuli received in each condition. This suggests that IWFM tended to respond to the emotional effects of pain uncertainty, whereas YPs showed no such effects. In addition, pain ratings were influenced by catastrophizing and trait anxiety such that higher catastrophizing and trait anxiety in IWFM corresponded to higher pain ratings for EO pain, whereas lower catastrophizing and trait anxiety corresponded with lower pain ratings for YPs.

An alternative explanation may be that certainty about painful events attenuated IWFM pain responses to HO and LO conditions, rather than increasing responses to EO conditions. This interpretation is consistent with findings that certain expectation of pain may decrease pain sensitivity.^{13,16} Perceived threat of pain may modulate pain responses upward when threat is high and reduce responses when threat is low.

Brain imaging studies have demonstrated decreased activation in the ventromedial prefrontal cortex (vmPFC) when pain is uncertain and increased activation when pain

is imminent.¹⁵ VmPFC activation/deactivation is inversely related to anxiety, such that the more anxious the subject, the less deactivation occurs when pain is uncertain. This complex interaction may be explained by increased vmPFC activity, which indicates increased arousal and behavioral reassessment, whereas decreased activity indicates reduced arousal and cognitive reappraisal of threat.⁹ For individuals with low anxiety, uncertainty regarding pain decreases vmPFC activity presumably because the threat is lower than when pain is certain. For those with high anxiety, increased arousal without decreased vmPFC activity for uncertain pain suggests that these individuals do not experience uncertainty as reduced threat. Our results provide behavioral and psychophysiological data to support this explanation and further suggest that pain uncertainty represents significant threat, particularly for those with a tendency to catastrophize.

The YPs' responses to pain did not vary as a function of the cognitive/emotional manipulations of certainty/uncertainty. YPs showed no differences in physiological arousal to pain for any of the conditions. This finding suggests activation of descending pain inhibition that resulted in overall lower arousal. The finding that pain ratings, but not arousal, differed across pain conditions suggests experienced pain intensity was not affected. Thus, cognitive appraisal of stimuli but not emotional responses appeared to modulate pain experience. Taken together with higher pain thresholds for YPs found in this study, these results appear consistent with findings that meditation can reduce pain sensitivity²³ but may not reduce pain intensity.²²

Response patterns for YPs differed from those of HVs and from those of IWFMs. Mean YP arousal levels appeared lower for all 3 conditions. Pain ratings appeared similar among HVs and YPs for the HO condition, but YP ratings were lower than those of HVs for EO and LO conditions. Because sample sizes were small and variability in HV was high, it is plausible that only the comparison tests for size of differences between conditions for each group proved significant. Nevertheless, these results are consistent with an interpretation of YPs as having lower affective response to pain than healthy non-yogis have.

Yoga as a Treatment for Symptoms of Fibromyalgia

Practitioners of Kundalini yoga, a tradition that includes breathing, exercise, and meditation during each session, were assessed in this study. YPs evidenced the lowest scores for emotional and cognitive imbalances (e.g., anxiety, depression, catastrophizing) and highest for physical well-being (e.g., reduced fatigue, stiffness). Practicing a style of yoga that incorporates breathing, exercise, and meditation

may prove beneficial for reducing responses to pain and improving emotional modulation.

A study of individuals with FM practicing Yoga of Awareness (YOA) for 8 weeks demonstrated improved mood and reduced pain catastrophizing.²⁶ The YOA intervention was specifically tailored for use with individuals with FM and similarly incorporated gentle stretching, mindfulness, breathing techniques, yoga-based education regarding coping strategies, and self-exploration in a group setting. The use of yoga practices to specifically target the reduction of emotional and cognitive effects of pain uncertainty may be particularly useful for IWFMs.

Study Limitations and Future Directions

This study evaluated long-term YPs rather than yoga as an intervention. It is possible that persons who self-select to practice yoga might display the pattern of arousal responses found independent of their yoga practice. Our findings are consistent with those of other studies of long-term yoga practice in that individuals who participate in yoga demonstrate improved mental health indicators compared with healthy non-yogis.²⁸ Studies showing both short-term and intermediate-term benefit from yoga for reducing anxiety and other mood and cognitive disturbances suggest that improvement in these areas may increase with the duration of practice.

The small number of participants in each group may have attenuated our ability to detect between-group differences. Larger numbers might have allowed better precision in the analyses of individual differences, especially in comparisons of HVs and YPs. Future studies should evaluate the effects of specific yoga practices, including meditation and lifestyle changes, on the associations between pain, anxiety, and pain uncertainty.

The preliminary findings of this study suggest that evaluations of the efficacy of a comprehensive yoga practice that includes exercise, breathing, and meditation, with a focus on reducing anxiety in response to uncertainty for individuals with FM, are warranted. Because this study included only individuals with FM who were active and able to maintain exercise, it will be useful to examine the effects of a yoga intervention for individuals with FM who are sedentary and have limited ability to exercise.

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Respiratory, Physical, and Psychological Benefits of Breath-Focused Yoga for Adults with Severe Traumatic Brain Injury (TBI): A Brief Pilot Study Report

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Abstract

Objective: This pilot study was designed to identify the potential benefits of breath-focused yoga on respiratory, physical, and psychological functioning for adults with severe traumatic brain injury (TBI). **Participants:** Ten individuals with severe TBI who self-selected to attend weekly yoga classes and 4 no-treatment controls were evaluated. **Methods:** Participants were assessed at pretreatment baseline and at 3-month intervals for a total of 4 time points over 40 weeks. Outcomes of interest included observed exhale strength, ability to hold a breath or a tone, breathing rate, counted breaths (inhale and exhale), and heart rate, as well as self-reported physical and psychological well-being. **Results:** Repeated within-group analyses of variance revealed that the yoga group demonstrated significant longitudinal change on several measures of observed respiratory functioning and self-reported physical and psychological well-being over a 40-week period. Those in the control group showed marginal improvement on 2 of the 6 measures of respiratory health, physical and social functioning, emotional well-being, and general health. The small sample sizes precluded the analysis of between-group differences. **Conclusion:** This study provides preliminary evidence that breath-focused yoga may improve respiratory functioning and self-perceived physical and psychological well-being of adults with severe TBI.

Key Words: yoga, traumatic brain injury, pranayama

Introduction

Traumatic brain injury (TBI) often leads to decreased quality of life.¹ Individuals with TBI frequently experience chronic pain, headaches, sleep disturbance,² and behavioral problems.³ In addition, reduced respiratory capacity often has pervasive effects on overall functioning.⁴ It has been suggested that patients with TBI might benefit from interventions that exceed the scope of conventional Western medicine.⁵ This study was designed to test whether participation in weekly, breath (*pranayama*)-focused yoga classes might benefit individuals with severe TBI.

Although yoga has been associated with physical and psychological health benefits, these outcomes are most often supported by anecdotal information.⁶ As the practice of yoga has gained attention in mainstream medicine,⁷ increased effort has been devoted to validating its health effects.⁸ A recent bibliometric analysis provides evidence of the efficacy of yoga for improving physical and psychological well-being.⁹ In addition to having a modulating impact on physiological and neurophysiological systems, yoga has been effectively used to treat depression,¹⁰ improve breathing in individuals with asthma,¹¹ and increase muscle strength, endurance, and flexibility.¹² Such findings suggest that yoga may offer multiple benefits to individuals with TBI, who are known to be at increased risk for respiratory illness¹³ and other physical and psychological difficulties. On the basis of evidence generated by earlier research, it was hypothesized that adults with TBI who participated in a yoga intervention program would demonstrate improvement in respiratory health and self-perceptions of physical and psychological well-being over time.

Methods

Participants

This convenience sample was drawn from adults with TBI who were clients of the Marin Brain Injury Network (MBIN) in Larkspur, California. MBIN runs a day-care and development center for people with adult-acquired brain injuries. Participants were classified as having severe brain injury on the basis of criteria from the Glasgow Coma Scale.¹⁴ Participants had acquired TBI in a variety of ways, from car or bicycle accidents to aneurisms. The nature of individuals' injuries was not controlled for in this study because of the small sample size. Individuals were at least 21 years old, exhibited severe physical disability, and had adequate cognitive functioning to be able to understand instructions and to partake in the yoga practices. All were non-smokers who reported no recent history of flu or swine flu.

The director and/or staff of the Stress Management Center of Marin (SMC) have provided yoga classes for clients of the MBIN for several years. Classes are conducted at a time when an SMC staff member is available to volunteer. Adults in our study self-selected to participate in the yoga classes ($n = 10$; 6 males, 4 females), and those who were unable to attend at the scheduled class time were assigned to the control group ($n = 6$; 4 males, 2 females). Two initial members of the control were unable to complete the assessments because of factors unrelated to the study, which yielded a final sample size of 4 (3 males, 1 female). Neither the yoga nor control group participants had a history of attending SMC yoga classes. Those in the yoga treatment group attended weekly, 30-minute group training/practice sessions for 36 weeks over a 40-week period, whereas controls did not attend any yoga classes but were assessed during the same week as were participants in the yoga group. Mean attendance for the yoga group was 33 weeks, and standard deviation was 6.5 weeks.

Systematic group bias was reduced in that individuals from both groups expressed interest in attending classes; however, those in the control group were precluded from doing so because of scheduling conflicts. A participant's ability to attend classes was dictated by considerations such as caregiver availability, regular doctor appointments, and other factors unrelated to this research. An equivalent yoga class was offered to control group members at the conclusion of the study.

Intervention

Yoga classes were intended to increase breath ease and awareness and to promote relaxation. Content was derived from several sources, including a version of the sun salutation, conducted in a chair, developed by Nischala Devi¹⁵ and designed for individuals with heart disease or high blood pressure. A seated twist that was held for 3 slow breaths was added to the middle of the sun salutation sequence. This was followed by a modified side stretch and forward bend, all performed in a chair (see Appendix A). Practices were taught based on the assumption that many of the clients were likely to experience severe spasms of the body and limbs caused by their TBI, and that some participants were taking antiseizure medication. Primary side effects of many of these medications include dizziness and drowsiness. These symptoms were likely to be a concern if participants stood during the yoga practice. The particular emphasis of the yoga relaxation exercises was to help make breathing easier and increase breathing awareness.

The pranayama (breathing) protocol was developed based on input from an experienced yoga instructor and

from Gary Kraftsow, founder and director of the American Viniyoga Institute. The practice included repetition of several exercises to build stamina and entailed systematic, coordinated contraction and release of the diaphragm, engagement of the intercostal muscles, and coordination of the two.

Participants were instructed to begin using slow sharp exhales then asked to link exhalations together in a series of sharp contractions and releases to “work” the diaphragm. Lion pose followed, during which the tongue is extended and the breath is “coughed out” to clear and relax the throat. This exercise was succeeded by metered breathing during which individuals counted the duration of each inhalation and exhalation, with the goal of increasing the length of each breath and ultimately to increase lung capacity. Participants were also asked to sing and sustain a note for as long as possible while viewing the second hand of a clock. This exercise was repeated 3 times to build stamina. Concluding chants that could be sung in 1 breath and that were selected to increase respiratory capacity were sung 3 times.

Data Collection

Data were collected from each participant at a preintervention baseline and 3, 6, and 9 months later. Information was gathered at the MBIN by a registered nurse who was blind to group assignment. Observed physiological measures included exhale strength assessed using a peak flow meter, breath-holding ability, breathing rate, holding a tone, and counted breaths (inhale and exhale). A brief history of recent respiratory illness and heart rate and blood pressure were also obtained. Self-reported physical and psychological well-being were measured using the SF-36 Physical and Mental Health Summary.¹⁶ Items were read to each participant and care was taken not to reveal which answers had been given during previous administrations. Those in the control group were assessed using identical measures and procedures at each of the 4 time points.

Institutional review board (IRB) approval for research with human subjects was obtained from the University of San Francisco. Research participants who received the protocol as part of the IRB review process were given a full description of the measures to be obtained in the study and were informed that the evaluation process would take approximately 20 to 30 minutes to complete. Participants were informed that they could withdraw from the research study or from the class at any time and were asked for written consent. Although all subjects had full cognitive functioning, not all were able to provide a written signature. In this case, they either made a mark and had the letter cosigned by their guardian, or the guardian signed on their behalf.

Analysis

Yoga group data were analyzed using a series of within-group, repeated-measures analyses of variance (ANOVAs). Time point (baseline, 3, 6, and 9 months) was the repeated measure, and the physical and psychological items and scales constituted the dependent factors. Power and effect size are important considerations when using small samples. The power (β value) of a test is the probability of failing to incorrectly reject the null hypothesis that no differences exist between the 2 groups. Using a beta of 50% to estimate the sampling error, the minimum number of cases required to reliably detect effects is typically 8 to 13.¹⁷ Using this criterion, the control group in our study ($n = 4$) was unsuitable for a between-groups analysis. Further, a number of items in the control group yielded zero variance (i.e., no variability in the responses over time), making them inappropriate for statistical analyses.

Results

Means, standard deviations, and F values for each of the respiratory measures for the yoga group are presented in Table 1. Control group values are presented for visual comparison. The yoga group demonstrated significant improvements over time with respect to 3 related measures of respiratory function, namely, breath holding, breath counting (inhaling and exhaling), and holding a tone, as well as reduction in heart rate. In contrast, the control group evidenced little change with respect to most of the physical measures, though trends toward increased exhale strength and ability to hold a tone were observed.

Means, standard deviation, and F values for the physical and psychological adjustment scales are presented in Table 2. The yoga group reported significant improvements in physical functioning, emotional well-being, and overall health over time, as well as decreases in self-reported pain. The control group also had a positive trend relative to increased physical functioning and general health. Cross-sectional and longitudinal differences between yoga and control groups could not be analyzed because of the small sample sizes; therefore, results should be interpreted with caution.

Discussion

After 9 months of data collection, the results were encouraging. Overall, the yoga group showed significant improvement while many of the control scores remained the same or declined. Yoga group members indicated

Table 1. Means and Standard Deviations for Observed Respiratory Measures and Heart Rate by Group

Measurement		Baseline	3 Mos.	6 Mos.	9 Mos.	F values Yoga <i>df</i> (3, 27)
Exhale Strength	Yoga	357.5 (109.3)	383.5 (141.4)	382 (138.9)	411.7 (135.9)	1.11, <i>p</i> > .05
	Control	392.5 (42.7)	398.8 (54.2)	398.8 (97.5)	417.5 (39.0)	
Holding a breath	Yoga *	46.6 (30.1)	56.4 (39.6)	59.3 (43.2)	66.7 (46.4)	4.98, <i>p</i> < .05
	Control	38.3 (18.8)	38.5 (19.2)	36.8 (6.2)	39.0 (4.6)	
Heart rate	Yoga †	73.7 (7.2)	70.8 (6.5)	65.3 (8.9)	67.0 (8.9)	16.71, <i>p</i> < .01
	Control	77.5 (6.1)	78.5 (7.0)	75.0 (12.6)	76.0 (7.5)	
Breathing rate	Yoga	14.4 (5.4)	16.4 (4.5)	14.6 (5.2)	16.3 (4.0)	0.43, <i>p</i> > .05
	Control	23.5 (11.8)	23.8 (11.7)	20.5 (3.4)	20.8 (3.8)	
Holding a tone	Yoga *	22.8 (10.7)	27.8 (14.1)	34.3 (26.3)	34.8 (18.5)	5.12, <i>p</i> < .01
	Control	18.3 (9.7)	17.5 (11.7)	26.8 (20.8)	21.3 (11.8)	
Counted breath in	Yoga *	12.2 (6.5)	14.6 (6.6)	19.1 (18.9)	25.1 (24.7)	3.61, <i>p</i> < .05
	Control	12.3 (1.7)	15.0 (4.8)	14.3 (7.2)	11.8 (2.4)	
Counted breath out	Yoga *	13.8 (6.6)	13.8 (9.3)	21.9 (26.3)	33.8 (29.2)	4.92, <i>p</i> < .05
	Control	12.3 (1.7)	15 (4.8)	15.3 (6.7)	13.8 (1.3)	

Note. *Significant increase *p* < .05; †Significant decrease *p* < .05

improvements on a number of self-reported items related to physical and emotional well-being. Increased subjective experience of an improved emotional state is particularly noteworthy given that individuals with TBI are often likely to experience seasonal affective disorders,¹⁸ yet longitudinal fluctuations in mood related to the time of year were not observed.

The researchers and MBIN staff were particularly interested in changes in psychological function as the rainy season began in northern California. We were encouraged that yoga group participants maintained improvements during the winter season, whereas the control group members were more likely to report mood problems during this period, suggesting that yoga may alleviate depression in patients with TBI.

Consistent with the initial hypotheses, the yoga group showed improvement over time on 4 of the 6 breathing measures, as well as decreased heart rate, whereas the control group demonstrated a trend toward improvement on only 2 domains of respiratory fitness. Providing yoga classes appears to enhance physical well-being and respiratory strength for individuals with brain injuries. These findings add to the limited research results supporting yoga as a tool

Table 2. Self-Reported Physical and Psychological Adjustment by Group

Measurement		Baseline	3 Mos.	6 Mos.	9 Mos.	F values Yoga <i>df</i> (3, 27)
Physical functioning	Yoga*	48.0 (44.8)	66.3 (33.2)	60.0 (42.2)	78.0 (30.8)	7.18, <i>p</i> < .01
	Control	60.0 (43.2)	61.3 (41.1)	66.3 (41.1)	92.5 (9.6)	
Role limit. physical	Yoga	72.5 (41.6)	95.0 (15.8)	85.0 (24.2)	95.0 (15.8)	1.25, <i>p</i> > .05
	Control	93.8 (12.5)	100.0 (0.0)	81.3 (23.9)	100.0 (0.0)	
Role limit. emotional	Yoga	86.7 (32.2)	90.0 (22.5)	87.5 (22.7)	93.3 (21.2)	0.19, <i>p</i> > .05
	Control	83.3 (33.3)	100.0 (0.0)	83.3 (33.3)	100.0 (0.0)	
Energy/fatigue	Yoga	69.0 (22.3)	70.0 (20.8)	72.7 (20.0)	76.5 (23.0)	0.61, <i>p</i> > .05
	Control	49.5 (36.6)	46.3 (32.8)	53.8 (22.1)	47.5 (23.6)	
Emotional well-being	Yoga *	74.8 (17.7)	77.2 (14.6)	84.1 (11.5)	87.9 (9.7)	6.52, <i>p</i> < .01
	Control	75.0 (10.5)	87.0 (8.9)	74.8 (10.5)	79.0 (2.0)	
Social functioning	Yoga	83.8 (11.6)	88.8 (14.0)	85.5 (11.9)	92.5 (8.5)	1.41, <i>p</i> > .05
	Control	68.2 (42.6)	93.8 (12.5)	70.6 (22.0)	80.6 (22.4)	
Pain	Yoga †	89.8 (21.8)	91.5 (16.0)	86.9 (21.2)	88.3 (20.8)	0.26, <i>p</i> > .05
	Control	100.0 (0.0)	100.0 (0.0)	80.9 (13.7)	96.9 (6.25)	
General health	Yoga *	80.5 (8.6)	82.2 (11.1)	84.0 (10.2)	83.4 (11.2)	4.09, <i>p</i> < .05
	Control	58.7 (21.0)	70.0 (22.7)	72.5 (17.6)	83.8 (18.0)	
Health transition	Yoga	52.5 (34.3)	75.0 (23.6)	63.5 (17.2)	67.5 (16.9)	0.47, <i>p</i> > .05
	Control	48.8 (18.4)	50.0 (45.6)	62.5 (43.3)	62.5 (14.4)	

Note. *Significant increase *p* < .05; †Significant decrease *p* < .05

for improving functioning in individuals with other neurological disorders.¹⁸

Limitations

This study was limited by the small sample size, which prevented analyses of between-group differences both cross-sectionally and over time. The lack of random assignment to either the yoga or control group also leaves open the question of a self-selection bias among participants. Given the limited ability to statistically analyze the data, findings are viewed as exploratory and should be interpreted with caution.

Conclusions

The study results provide preliminary support for the benefit of breath-focused yoga for adults with severe TBI. Improvements in breathing and self-reported psychological and physical well-being were noted for participants who attended yoga classes, whereas the same effects were not as prevalent among the control group. Although these findings cannot be generalized to younger individuals, populations with less severe head trauma or those with TBI caused in conjunction with other psychoemotional stressors, such as military combat, they do suggest the value of yoga for a population with TBI and add support to the growing number of studies validating the value of yoga for improving health status in a variety of populations. The authors are currently working in cooperation with the Veteran's Administration Hospital staff in San Francisco to study the effects of participating in this breath-focused yoga program on military veterans with TBI. Examination of the effects of breath-focused yoga for a large, diverse group of men and women will permit greater exploration of the mechanisms from which yoga may benefit individuals with TBI, as well as the longitudinal progression of these effects.

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Appendix A

Yoga and Breathing Protocol (additional details are provided in the methodology)

- 1) Sit comfortably with hands on belly and breathe. (3x). Notice how you feel.
- 2) Chair sun salutation (3x)
- 3) Side angle stretch (1x, ea. side)
- 4) "Ho, ho, ho." Pop the diaphragm loose. (10–12x)
- 5) Lion stretch for throat (5x)
- 6) Lion with tongue in: opening and closing jaw (5x)
- 7) Sips and puffs (short, cumulative, counted breaths; 3x, ever-increasing duration)
- 8) "RA..." Holding tone with stopwatch (3x)
- 9) Sun salutation (1x) in chair¹⁵
- 10) Sit comfortably with hands on belly and breathe. (3x) Notice how you feel.
- 11) Chant "Loka Samesta Sukinoh Bhavantu" (3x)
- 12) Chant "Shanti, Shanti, Shanti" (3x)

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Research

Gentle Hatha Yoga and Reduction of Fibromyalgia-Related Symptoms: A Preliminary Report

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Abstract

Objectives and Methods: This study examined whether gentle Hatha yoga reduced fibromyalgia-related symptoms for a convenience sample of 10 participants ranging in age from 39 to 64 years who received yoga instruction 2 times per week for 8 weeks. **Methods:** Respondents completed the Fibromyalgia Impact Questionnaire 1 time per week and provided weekly journal reports regarding their health status. Pre- and postintervention manual tender point evaluations were also conducted. **Results:** Findings provide evidence of association between participating in gentle Hatha yoga classes and reduced fibromyalgia-related symptoms. **Conclusions:** Additional randomized controlled trials with larger sample sizes and greater empirical rigor are needed to more fully understand this relationship.

Key Words: yoga, fibromyalgia

Introduction

Fibromyalgia (FM) has been recognized in the medical lexicon for nearly 2 decades.¹ Individuals with FM commonly experience diffuse pain, sleep disturbance, anxiety, migraines, irritable bladder and bowel, and other conditions. There is a high degree of variability in its presentation, however. Two to 4 percent of the American population are affected by FM, the majority of whom are women.² Loss of physical mobility, concentration, memory, and motivation and the presence of depressive symptoms are most frequently endorsed as challenges related to living with FM.³ A global survey of the impact of FM featured in *United Business Media*, June 2011, noted that FM poses a considerable financial burden on society as a result of inability to work and lost income.³ This study evaluated whether participation in gentle Hatha yoga classes was associated with FM-symptom reduction.

It takes an average of 1.9 to 2.7 years and multiple physicians to accurately detect and diagnose FM. One factor contributing to the length of time to diagnose FM is the

lack of specific measurement strategies to diagnose the condition.² Historically, diagnosis of FM involved an assessment of pain on 18 specific sites called *tender points*. A patient received a diagnosis of FM if he or she endorsed tenderness of 11 of 18 points following palpation. This strategy yielded a considerable number of false diagnoses, however, and was replaced in May 2010 by a more standardized strategy that involved use of the widespread pain index (WPI) and the symptom severity (SS) scale. Using the WPI, patients rate whether they have experienced pain during the past week in 19 regions of the body. Using the SS, individuals rate the presence of symptoms, including fatigue, lack of mental clarity, and lack of restful sleep.⁴ Patients receive a positive FM diagnosis if they endorse pain in 7 or more areas in combination with fatigue, cognitive impairments, and poor sleep for at least 3 months in the absence of any other disorder that could account for such symptoms or functional disturbances.

Presently there is no cure for FM. Treatment includes both medication and nonpharmaceutical modalities. Complementary and alternative therapies, such as yoga,

therapeutic massage, acupuncture, and other mind–body therapies, may be useful; however, there is insufficient data to support their effectiveness.² This study explored whether gentle Hatha yoga was associated with reduction of symptoms and functional deficits for people with FM.

Yoga and Fibromyalgia

Several studies have examined the functional utility of regular yoga practice for reducing symptoms of FM. Curtis and colleagues reported an association between participating in yoga classes and reductions in pain and catastrophizing, increases in acceptance and mindfulness, and alterations in total cortisol levels in women with FM.⁵ In a recent pilot study that used a yoga awareness program that included gentle poses, meditation, breathing exercises, yoga-based coping instructions, and group discussions, Carson et al. found a trend toward improvement on standardized measures of FM symptoms and functioning, including pain, fatigue, and mood, and in pain catastrophizing, acceptance, and other coping strategies.⁶

Mindfulness-based stress reduction (MBSR) includes mindfulness meditation and mindfulness-based yoga. A total of 177 women with FM were randomly assigned to either an 8-week, structured MBSR program, an active control procedure controlling for nonspecific effects of MBSR, or a wait-list control group. Health-related quality of life was assessed at baseline and 2 months posttreatment, as were depression, pain, anxiety, somatic complaints, and a proposed index of mindfulness. Analyses did not support the efficacy of MBSR for individuals with FM; however, some modest benefits were detected for participants in the MBSR group.⁷

Though a number of studies have examined the impact of yoga relative to changes in symptoms related to FM, there is a pressing need to better understand the relationship between yoga practice and improved health outcomes for individuals with FM.

Given the modest evidence linking yoga with improved reductions in sleep disturbance, anxiety, and various types of chronic pain, it was hypothesized that individuals with FM who engaged in gentle Hatha yoga would evidence reductions in FM-related symptoms.

Methods

Participants

Participants were required to have physician-diagnosed FM based on the criteria established by the American College of Rheumatology. Data collection for this study occurred prior to the adoption of the WPI and SS index for

diagnosing FM. Participants ranged in age from 39 to 64 years and included women only. Participants did not have other health conditions that limited their ability to participate in yoga, such as chronic back pain from herniated or bulging discs, pregnancy, or hip or knee replacements. All shared symptoms of pain, sleep deprivation, and fatigue. Individuals were asked to continue their daily routines and current treatments but were instructed not to begin any new regimens during the study. If the participants began new treatments or changed their typical routine, they were asked to note these changes in their journals. Participants were required to have not practiced yoga or other regular stretching routines, including tai chi, for at least 1 month prior to study onset. They were required to commit to 2 yoga sessions per week, miss no more than 20% of the sessions, and complete weekly assessments consisting of a questionnaire and journal entries. Of the 10 participants who met inclusion criteria, 2 withdrew and 2 did not complete the required number of sessions.

Procedures

Baseline data were collected one week prior to treatment onset, with participants completing the Fibromyalgia Impact Questionnaire (FIQ) and writing their first journal entry. A physician performed a manual tender point evaluation before the yoga intervention. At the end of eight weeks, the participating physician administered another tender point evaluation.

Measures

The Fibromyalgia Impact Questionnaire (FIQ). The FIQ measures the number of days an individual felt well, was unable to work (including household chores), and experienced pain, fatigue, morning tiredness, anxiety, and depression in the past week. Higher scores reflect greater symptomatology. The maximum score is 100 and the average score is approximately 50. People who are severely affected by FM usually score 70 or more on the FIQ. The FIQ has been tested for reliability and validity and has been translated into numerous languages.

Tender point evaluations. A physician experienced in treating people with FM conducted the tender point evaluations. These evaluations occurred prior to the intervention and within 1 week after intervention completion. Participants rated their pain as 0 (*no pain*), 1 (*some pain*), or 2 (*much pain*). This study was conducted prior to the change of evaluation methods in May 2010, when the tender point evaluation was changed to a widespread-pain index.

Weekly journal entries. Participants completed weekly journal entries beginning 1 week prior to intervention and

continuing weekly for the duration of the study. Individuals were asked to write about how they felt physically and mentally and if anything had changed throughout the study, such as their treatments or life circumstances. Themes from the journals were identified weekly and a table was created to display the common themes.

Intervention

In preparation for the study, the first author, a health and wellness professional, discussed yoga as treatment for FM with medical providers, who expressed that some patients report feeling worse after trying yoga, with some experiencing pain for days following exercise. These concerns were taken into careful consideration when designing the yoga sequence for this study. The intent was to use an eclectic blend of yoga styles, including Vinyasa, Kundalini, and Iyengar yoga.

Hatha yoga uses flowing postures that link breath and movement for the purposes of reducing stress, gaining energy, and increasing flexibility and overall mobility. In our study, postures that require great strength and flexibility or those that are held for long periods were not used, with the exception of several restorative postures that are held for a longer duration at the end of class. Participants were frequently reminded to perform only those postures they were comfortable with and that did not cause pain.

The class design involved nostril breathing for generating heat and calming the mind, gentle standing poses that flowed with breath, seated postures, and guided imagery. Participants always began standing in mountain pose while practicing breath work solely through their nostrils (Ujjayi breath) unless this type of breath was uncomfortable or unnatural. In such cases, any type of breathing was acceptable. Ujjayi breath was chosen for its calming effects on the mind during the exhale and its energizing and heating effects. After about 5 minutes of breath work involving centering exercises to bring participants into the present moment and to encourage body awareness, participants began to perform a series of postures in which inhalation and exhalation were linked with movement. All participants were given modifications to poses when needed. One participant did the practices seated in a chair because of knee pain. (A description of the sequence of poses is available from the first author).

Data Analysis

Paired *t*-tests and Wilcoxon's signed-rank test were used for the study. These statistical methods were chosen because of the sample size. The paired *t*-test was used to compare

baseline FIQ to postintervention FIQ scores, and Wilcoxon's signed-rank test was used to identify pre- to postchange in the tender point evaluations.

For the qualitative data, participants' journals were analyzed to identify common themes throughout the 9 weeks of data collection.

Table 1. *Pre- to Postintervention Tender Point Evaluation Scores and Change Scores*

Participant	After	Before	After–Before
A	20	17	3
B	25	23	2
C	18	23	–5
D	26	28	–2
F	18	20	–2
J	27	30	–3
K	18	21	–3
L	15	19	–4
M	15	15	0
N	23	26	–3

Results

Quantitative Analyses

A paired *t*-test of the mean of FIQ scores revealed a significant trend toward an overall decrease in FM-related symptoms from baseline to postintervention ($p = .0029$). The 14.1-point pre- to posttreatment difference represents a 28% reduction in FIQ scores.

Table 1 illustrates pre- to postintervention tender point evaluation scores and change values by participant. A higher score indicates more reported pain. As such, 7 of 10 participants reported declines in pain, 2 indicated increases, and 1 reported no change. McNemar's Exact Test was used to evaluate change. No significant pre- to postintervention reductions in pain ratings were detected after each participant's different tender point ratings (18 total locations) were compared individually on both right and left sides.

Qualitative Analyses

Themes from the journal entries were identified and are shown in Tables 2 and 3. Table 2 lists negative themes identified in participant journals. Participants endorsed more pain symptoms at the beginning of the intervention than in

the following consecutive weeks. Although neck and back pain were indicated throughout the study, fewer people endorsed focal pain over time. In Week 2, 7 people reported back pain, whereas in Week 7, only 1 person indicated experiencing back pain. As illustrated in Table 2, negative comments about symptoms either decreased or were no longer mentioned in the journals after the initial weeks.

Table 2. *Endorsement of Negative Journal Themes Across Time*

Themes	Baseline	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8
Stressed	2*	1						1	
Depressed	2	2				1		2	
Pain	8	9				2			
Back pain	4	7			2		1	4	1
Neck pain	4	3					1	3	1
Leg pain		2					1		
Arm pain		2							
Shoulder pain					2			1	
Weather affects pain		5			3		1	2	
Fatigue		2		1				2	
Headache			2	1	2	2	1		
Feeling stiff			2	1	2	1	2		
Yoga is not helping					1		1		
Yoga hurts					1				

Note. *Values represent number of individuals who endorsed this theme on a given week. Blank fields indicate no response was provided for that item.

Table 3. *Participant Endorsement of Positive Journal Themes Across Time*

Themes	Baseline	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8
Looking forward to yoga	4*								
Feeling good	2		2		1		3		
Yoga is helping			3	4	5	5	3	5	3
Doing yoga at home			2		2	4		5	7
Not feeling as stiff			2	1					
More energy				2					
Sleeping better				1					

Note. *Values represent number of individuals who endorsed this theme on a given week. Blank fields indicate no response was provided for that item.

Table 3 reveals the positive themes identified. Very few positive comments were offered during the first few weeks of journal writing, but positive comments were more frequently indicated over time.

Discussion

Mean-level analyses provided evidence of diminished self-reported FIQ symptoms from preintervention baseline to postintervention assessment. Likewise, tender point evaluations indicated a reduction in the endorsement of pain over time. With respect to the journal themes, the negative content decreased over time, whereas positive experiences were more frequently endorsed as the weeks progressed. Although pain was always present from start to finish, the frequency of pain-related journal entries declined over time. Overall, our quantitative findings are consistent with those from earlier studies in which benefits of yoga practice for individuals with FM were detected.⁵⁻⁷

Limitations and Future Directions

Examination of FIQ change scores, participant journals, and combined tender point scores suggests that participants reported experiencing fewer FM-related symptoms during and immediately after participating in an 8-week yoga intervention. Nevertheless, findings are preliminary and should be cautiously interpreted. Participants self-selected into the program and findings relied exclusively on self-report data, offering the potential for reporting biases. The lack of a randomized control group prohibited our ability to detect whether reductions in pain were an artifact of the intervention or the result of other factors, including group social support and attention from instructors, among others. The very small sample precluded a comprehensive analysis of longitudinal effects of the intervention, and the lack of additional postintervention follow-up data collection prevented us from understanding whether or not reductions in FM symptoms persisted over time. Last, the lack of standardization of the yoga invention made it impossible to examine which, if any, components of the program were most beneficial for persons with FM.

It would have been useful to have gathered tender point data throughout the course of the study concurrent with FIQ and journal reports to cross-check for reporting accuracy. This was neither convenient nor feasible, however, because tender point data collection required participation by a physician and would have added to the weekly assessment demand. Future studies would benefit from more frequent tender point evaluation.

Participant feedback suggested that weekly journal entries were not sufficient to capture the richness and variability of their experience. Further, many expressed the need

for increased frequency of classes, and several reported attempting a home yoga practice to alleviate symptoms. As such, it is important for future research to examine dose–response factors relative to pain relief.

Preliminary evidence supports yoga as a cost-effective, accessible option for pain relief for persons with FM. Further studies that use greater methodological rigor are required to better understand these findings.

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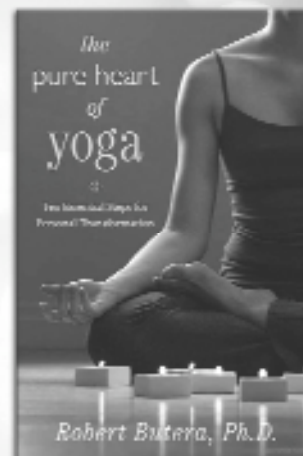
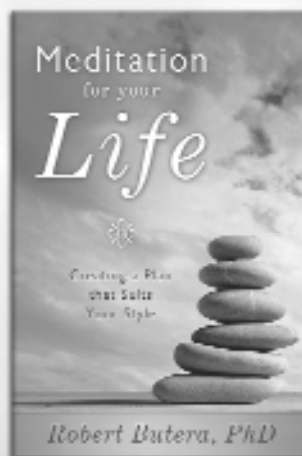
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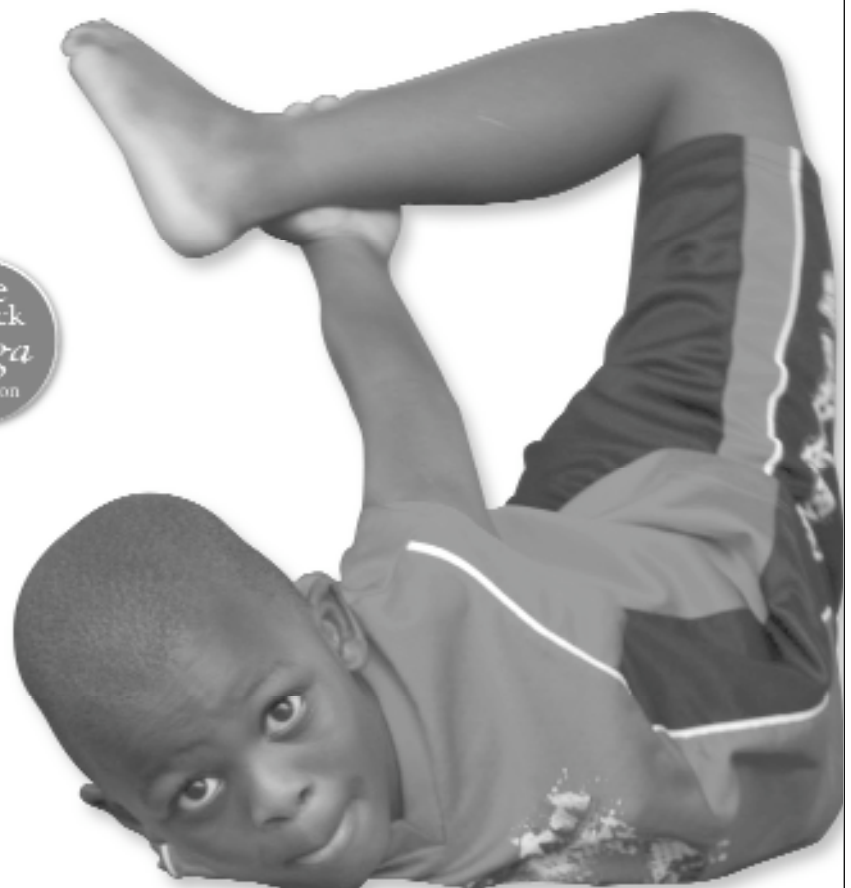
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Issues in Yoga Therapy

Perspective

Bridging the Practices of Yoga Therapy and Behavioral Health Service Delivery for Adolescents

Michelle Walsh, MA, LMHC, LPC

Historically, substance use and mental health disorder interventions for adolescents were derived from adult models, such as Cognitive Behavioral Therapy and 12-step programs, which are rooted in traditional talk therapy. Young people may struggle to benefit from treatments using these models because they may not be developmentally appropriate. A need exists for developmentally attuned interventions that can engage children and adolescents. This article briefly reviews the process of bridging yoga therapy and behavioral health service delivery for adolescents served by the Massachusetts Department of Public Health (DPH).

In my experience as a licensed mental health counselor, I have observed that children and adolescents benefit from mental health treatment models that use experiential techniques. I found yoga and mindfulness meditation to be particularly useful in helping youths access their inner world. I approached the Massachusetts DPH about creating a new treatment model that included yoga. The goal was to implement this therapeutic strategy across the DPH state-funded system of care and to make these methods accessible to those who could not afford complementary alternative healthcare. With support from the DPH administration, we began to integrate yoga therapy and a mindfulness-based wellness curriculum into their healthcare delivery system.

The biggest challenge for implementing these changes was addressing the skepticism of mental health and substance use disorder professionals. I encountered a systemic resistance to change, which created a barrier to integrating yoga therapy and other complementary alternative medicine approaches with mainstream healthcare. Fortunately, a growing body of empirical evidence supports the benefits of yoga therapy and mindfulness meditation for individuals with psychological dysfunction. This research supports the

implementation of holistic, evidence-based approaches to sustainable health and well-being using techniques such as yoga therapy, mindfulness training, and mindfulness-based stress reduction.


Communication is essential to achieving consensus for systems-level change. In this situation, knowledge of the language of both Western medicine and yoga therapy enabled me to build a bridge that would help me effectively communicate the goals and benefits of each approach and of their integration. The primary objective was to develop a strategy that maintained the integrity of the holistic approach of yoga while identifying corresponding Western treatment methods so that a bridge could be constructed between behavioral health and yoga therapy. This process was guided by Patanjali's Eight Limbs of Yoga, which provides a map to happiness and freedom from suffering. The *yamas* and *niyamas* are synchronous with the principles of self-awareness, healthy relationships, and values that are embedded in DPH's current adolescent and young adult treatment themes. Finding these points of intersection and communicating the values of yoga in a nonsectarian way were crucial to the success of this process.

By building upon the common threads of yoga and traditional mental health and substance use treatment, I was able to educate the clinical staff about yoga philosophies and practices that complemented existing treatment methods. In essence, a goal was to illustrate how the techniques of yoga therapy deepened adolescents' understanding of how to effectively use skills taught in Cognitive Behavioral Therapy programs. Demonstrating the bridge between these two approaches made their integration less threatening to behavioral health professionals familiar with using traditional treatment modalities.

The power of this program relied on engaging the adolescents and behavioral health professionals in the experiential practices, which are at the core of yoga therapy. Adolescents appreciated the opportunity to explore the connection between their minds and bodies. Program staff discovered the potential benefits of yoga therapy when they observed positive changes in their clients. Upon observing these changes, program staff became interested in exploring some of these techniques as a part of their personal self-care.

Brokering a systems-level change that integrated yoga therapy and mindfulness meditation-based approaches with traditional mental health and substance use service delivery required time, patience, tenacity, and faith in the potential of this work. The process of integrating these approaches into the DPH model of care, which had no prior history of using these forms of alternative medicine, took 3 years. Working with complex systems that are invested in traditional Western medical culture can be overwhelming, and the challenges can appear insurmountable. As we in the yoga community are supported by growing scientific evidence of the effectiveness of yoga therapy on mental health outcomes, we have increasing opportunities to effect change by bringing these amazing practices into our healthcare systems.

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Issues in Yoga Therapy

Clinical Group Supervision in Yoga Therapy: Model, Effects, and Lessons Learned

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The New England School of Integrative Yoga Therapeutics

Abstract

Clinical supervision is an integral component of therapist training and professional development because of its capacity for fostering knowledge, self-awareness, and clinical acumen. Individual supervision is part of many yoga therapy training programs and is referenced in the IAYT Standards as “mentoring.” Group supervision is not typically used in the training of yoga therapists. We propose that group supervision effectively supports the growth and development of yoga therapists-in-training. We present a model of group supervision for yoga therapist trainees developed by the New England School of Integrative Yoga Therapeutics™ (The NESIYT Model) that includes the background, structure, format, and development of our inaugural 18-month supervision group. Pre- and postsupervision surveys and analyzed case notes, which captured key didactic and process themes, are discussed. Clinical issues, such as boundaries, performance anxiety, sense of self-efficacy, the therapeutic alliance, transference and countertransference, pacing of yoga therapy sessions, evaluation of client progress, and adjunct therapist interaction are reviewed. The timing and sequence of didactic and process themes and benefits for yoga therapist trainees’ professional development, are discussed. The NESIYT group supervision model is offered as an effective blueprint for yoga therapy training programs.

Key Words: Yoga, therapy, clinical group supervision, boundaries, performance, anxiety, process, transference, counter-transference, learning.

Introduction

In 2006 the New England School of Integrative Yoga Therapeutics™ (NESIYT) began a 500-hour yoga teacher training program. The foundation of this program was the Integrative Yoga Therapeutics method, which integrates yoga therapy with mindfulness-based practices to address concerns such as physical injuries, anxiety, depression, insomnia, chronic pain, and immune disorders.^{1,2} The didactic portion of the 500-hour curriculum included the neurobiology of yoga; yoga and Ayurveda; Integrative Yoga Therapeutics for Chronic Pain Disorders; Integrative Yoga Therapeutics for Bipolar Disorder, Eating Disorders, and

Addictions; Integrative Yoga Therapeutics for Mood Disorders (such as anxiety and depression) and for Spinal Anomalies (such as kyphosis, lordosis, scoliosis, sacroiliac joint dysfunction); and The Art of Self-Care. In addition, 500-hour participants also received didactic and experiential training in introductory yoga therapy practice in the form of four 15-hour practicum modules spaced over 14 months. The practica included providing yoga therapy services to volunteer clients from the community. Trainees conducted sessions, completed extensive assignments, received verbal and written individual and collegial feedback, and completed guided *svadhyaya* (self-study) assignments.¹

In early 2008, prior to the International Association of Yoga Therapists' (IAYT) development of standards for the training of yoga therapists, a subset of teachers in the NESIYT 500-hour program expressed a desire to add a special clinical focus to their training. Their goal was to gain expertise in conducting one-on-one yoga therapy sessions. We designed the Integrative Yoga Therapeutics Apprenticeship Track (IYTAT) to enable our yoga therapist trainees to learn and develop foundational yoga therapy skills. The IYTAT included group supervision, a modality not yet widely used in yoga therapy training. This article documents the theoretical framework, learning and process themes, and analysis of the inaugural group supervision experience.

Theoretical Framework

Individual and group supervision are routinely used in the pre- and postgraduate training of social workers, psychologists, and psychiatrists.³⁻⁸ The efficacy of group supervision is supported by research, and it is widely used in clinical and educational training programs.⁹⁻¹¹ Clinical supervision models and practices from psychology and social work¹² can be applied to the yoga therapy training environment with moderate adaptation.

Adult learning theory and research contain several key principles that informed the NESIYT model of group supervision. According to adult learning theory, the development of cognitive, emotional, and social complexity is ongoing in adulthood.¹³ Differences exist in the way that novices and experts learn and acquire expertise as they are exposed to a variety of contexts and environments.¹⁴ The NESIYT model provided the opportunity for exposure to a breadth of cases and learning scenarios over time. It was also designed to establish a "holding environment" for learning that is characterized by consistency, support, and challenge.^{15,16} This article describes the structure and process of the NESIYT group supervision model and its benefits for training yoga therapists.

Methods

Participants

The inaugural IYTAT supervision group began with 10 participants. Prior to the onset of group supervision, we administered a Pre-Supervisory Survey to participants¹⁷ (see Appendix A). This survey assessed basic trainee demographics and information regarding their prior yoga and teaching experience, other mind-body practice and training, and previous experience with one-to-one yoga instruction or

therapeutic work (as client or teacher). Trainees' goals, beliefs, and attitudes about yoga therapy were obtained, as were their expectations of supervision, conceptualization of the yoga therapist-client relationship, definitions of therapist roles and responsibilities, and other beliefs that would help shape and direct the didactic and process-oriented structure and content of supervision.

The group included 9 women and 1 man ranging in age from 35 to 50. All participants had a college degree and most had advanced degrees in fields including architecture, law, education, and business. Most were working full-time in their respective fields both prior to and during training. The group represented a wide range of experience with yoga. Some had practiced yoga from 5 to 15 years, 2 had facilitated 30 or more one-to-one yoga sessions, 7 had conducted some sessions (<20), and 1 had no experience providing one-to-one yoga therapy. Seven of the original 10 pre-supervision participants completed the program (3 withdrew early for personal or work/life balance reasons). All trainees had previously been students in the NESIYT 200-hour yoga teacher training program and were enrolled in the NESIYT 500-hour yoga teacher training program during the group supervision period.

Trainees completed a Post-Supervisory Survey at the conclusion of the 18-month program. This measure revisited the initial survey's questions about the roles of yoga therapist and client and the nature of the therapeutic relationship. It also assessed the skills trainees acquired during the process and their feelings about the format of the group supervision.

Clinical Group Supervision Model

The NESIYT model included monthly group meetings for 18 months. Each session lasted 2.5 hours, totaling 45 direct group supervision hours. Between sessions, trainees saw clients individually and took notes about their self-reflections, their experience with each client, and the process of yoga therapy.

During this time group members rotated responsibilities for meeting note-taking, documentation, and follow-up. Major and minor themes of the therapeutic and supervisory work were recorded at every session. Case discussion and supervision summary notes were also shared with the group and reviewed after each session. Documentation of session content enhanced the awareness, integration, and recall of emerging supervision themes that built progressively over time.

Most of the trainees' clients were referred to the Center for Integrative Yoga Therapeutics by psychotherapists or by physicians familiar with the center's work. Some clients were already engaged in one-on-one work with our more

experienced yoga therapists-in-training. As the supervision and didactic training progressed, Forbes instructed and supervised the trainees in conducting effective intake sessions. Each therapist went through a rotation as “intake coordinator” to gain practice in conducting effective client intakes. The trainee acting as intake coordinator would match each client with the most appropriate therapist and provide Forbes and the trainee with the intake information.

After the intake and initial communication with referral sources (when appropriate), determination was made about whether a client could be safely seen in his or her home. In the majority of cases, home-based sessions occurred. In some instances, particularly with clients already in treatment, sessions were conducted in a studio or office setting. High-risk clients (i.e., those with severe depression, a history of suicidal risk, bipolar disorder, or highly addictive behaviors) were not seen by trainees. All yoga therapy clients were amenable to treatment, though some evidenced some resistance to change. Nearly all clients were seen at a reduced rate or at a preestablished rate if they were already in treatment. All clients signed a formal consent to treatment, which conveyed their understanding that the work would be therapeutic and involve yoga but not be psychotherapeutic. They were informed that trainees might discuss their case in supervision and were advised that only the first initial of their name would be used in written and verbal communication.

The group used several structured formats for pre-presentation case preparation, reflection, and questions, as well as for case presentations (see Appendices B and C) and post-meeting follow-up. These formats were intended to optimize the group’s time management during and after super-

vision sessions. They also helped create a safe therapeutic environment for supervision meetings. Group members provided feedback about the case presentation and summary forms, which were modified and improved throughout the supervisory period.

Trainees completed written homework assignments in preparation for each supervision session. The week prior to meetings, presenting trainees sent a report to group members that detailed the salient aspects of the case, outlined their case formulations, and highlighted areas in which they felt challenged. Participants agreed to read each case report before meetings and to prepare clarifying questions and comments. This advance preparation time helped enhance time management and the quality of collegial feedback.

Two to 3 case presentations occurred at each meeting. Presenters, colleagues, and supervisors had roles and tasks for each stage of the case presentation that were specified by the case presentation format (Appendices B and C). This structure enabled group members to share responsibility for productive exchange and to experience case discussion from a variety of perspectives.

To help with the assimilation of supervisory input, case presenters filed a brief report within 72 hours of the meeting that detailed their perceptions about the supervision experience, summarized changes in their case formulation, and suggested directions for future sessions. Reports were kept confidential; only therapists’ names and clients’ first initials were used. Session notes and summary themes were shared electronically. This strategy helped participants track and internalize the development of concepts, didactic knowledge, and experiential awareness over the 18-month period.

Table 1. Pre-Supervisory Survey

What do you think are the most important roles and responsibilities of a yoga therapist?	What do you think are the most important roles and responsibilities of a yoga therapy client?	Please describe the qualities and characteristics of an ideal relationship between yoga therapist and client:
<p>A yoga therapist should be able to</p> <ul style="list-style-type: none"> • create a safe and healthy container for clients’ growth • maintain healthy boundaries • be consistent and reliable • be deeply present • be empathic • be flexible in adapting to client issues and to the process of the therapy session • observe and integrate both obvious and subtle cues from the client • receive constructive feedback from clients • empower the client to take an active role in his/her health and well-being • demonstrate a thorough beginning knowledge of Integrative Yoga Therapeutics 	<p>Yoga therapy clients should</p> <ul style="list-style-type: none"> • take responsibility for their healing and growth • be ready to make a change • maintain and respect healthy boundaries • be present • be willing to change their personal narratives • have trust in themselves and the yoga therapist • be open minded to the possibility of growth and change • recognize their ability to grow • be patient • communicate honestly about their presenting issues 	<p>The ideal relationship between a yoga therapist and client is characterized by</p> <ul style="list-style-type: none"> • appropriate boundaries • open communication between both parties • a clear sense of roles and responsibilities • patience with the process of yoga therapy • a partnership of two valued systems of expertise: the therapist’s expertise in safe, therapeutic and life-enhancing yoga practices and the client’s expertise in self-reflection and intention toward self-appreciation • a mutual willingness to explore uncharted territory • mutual trust

Table 2. *Supervision Themes*

Theme	Phase 1	Phase 2	Phase 3
Process Themes: Supervision, Learning, Experience	(i) Experiencing Exposure, Rawness, Surveillance	(r) Sitting with Discomfort; Performance Pressure	(r2) Offering Quality Feedback; Self-efficacy
Didactic themes			
Therapeutic boundaries	(i)	(r)	
Adjunct therapist interaction	(i)	(r)	
Therapeutic sequencing	(i)	(r)	(r2)
Evaluation of client progress		(i)	(r)
Client transference		(i)	(r)
Therapist countertransference		(i)	(r)
Parallel process issues		(i)	(r)

Note. (i) = theme introduced, (r) = theme revisited, (r2) = revisited again.

Details of Group Supervision

A. Pre-supervision. Table 1 includes short paraphrases and quotes that illustrate participants' responses to open-ended questions in the Pre-Supervision Survey. Several primary themes emerged that informed supervisory dialogue in the early and later phases of group supervision.

Responses suggested a group that had high expectations for themselves as they moved into the role of yoga therapist, for the "performance" of their clients, and for the quality of the therapeutic alliance between therapist and client. Trainees' elevated expectations for themselves suggested the potential for low self-esteem and greater likelihood for performance anxiety and self-judgment (Table 2). Many expectations were unrealistic and commensurate with developmental goals for teachers in the NESIYT Teacher Training svadhyaya (deep and reflective self-study). These expectations highlight the potential for frustration with client progress, for difficulties with empathy, and for minor disruptions in the therapeutic alliance. The responses to this section of the survey provided rich material for reflection throughout the supervisory period.

The Pre-Supervisory Survey also asked participants to rate their levels of proficiency in core aspects of the IYTAT curriculum and to reflect on the concept of "proficiency." Although a few therapists rated themselves as "expertly proficient," most therapists' assessments did not exceed the moderately proficient to quite proficient range. Self-perceived ratings of highest proficiency occurred in areas most closely related to group (yoga class) instruction or the one-on-one teaching of yoga skills that might be found in a small-group setting. Self-assessments in the medium range of proficiency occurred when participants described working with clients with clearly defined physical presenting issues. Self-assessments in the lowest proficiency range were associated with working with clients who presented with complex mind-body issues, such as addictions and bipolar disorder, which might require greater therapeutic skills and

spontaneous innovation. The group's overall beliefs about proficiency expressed trust that continued clinical practice would generate increased expertise over time.

Finally, the Pre-Supervision Survey asked participants to identify personal and professional goals, expectations, and desired supports, and to note relevant self-study themes. Trainees indicated that they expected to grow personally and professionally and that they anticipated a strong self-study component in the supervisory setting. Their personal and professional goals included cultivating healthier boundaries, learning practices to offset the consequences of being an "empath," creating personal and professional grounding and structure, receiving input and support from their colleagues, deepening their substantive knowledge and creativity, and developing language for emerging emotional and spiritual themes in sessions.

B. Supervision. The supervision process was divided into 3 distinct 6-month phases. For each phase we examined 2 types of themes: didactic, pertaining to the development of yoga therapy skills, and process, relating to the supervision itself, including awareness of learning and svadhyaya (self-study) issues. Table 2 summarizes the main themes occurring in each of the three phases. It is worth noting that these themes were explicitly named and discussed throughout the group supervision process. They were tangible and accessible to the participants in real time and revisited in postsession analysis and in future sessions. This article reviews themes integral to and arising repeatedly in group supervision; it does not include a complete listing of supervisory topics.

The group supervision environment and structure enabled us to discuss and document important supervisory themes. Trainees received the benefit of witnessing themes arise in multiple contexts: in their own presentations, in those of their peers, and in different situations over time. The group supervision structure provided trainees with repetition and practice. It offered different vantage points and perspectives to support their learning and growth in a way

not typically afforded in individual supervision. Adult learning theory supports this unique attribute of group supervision; it establishes that the opportunity for “analogical encoding” (working with a complex concept or skill through different examples) fosters deeper learning (e.g., Horii, CV 2007). The discussion of themes throughout the supervisory process enabled the development of flexible and nuanced clinical competencies. We are not aware of any comparable information about individuals beginning yoga therapy supervision or about detailed didactic and process themes for beginning yoga therapists without supervision.

Phase I: The First 6-Month Supervision Period

In Phase I the group created and reinforced the “container” of group supervision. Collectively, the therapists identified shared didactic themes relating to the content of the sessions and the therapeutic frame or container of the session (including boundaries and the pacing of therapeutic work). The group also worked with several process themes that pertained to the therapists’ direct experience of the supervision.

Phase I didactic themes

Therapeutic boundaries. In Phase I, the group addressed a foundational theme that recurred through all 3 phases of supervision: the creation, reinforcement, and refinement of therapeutic boundaries between yoga therapist and client. Discussions regarding boundary issues are typical for beginning psychotherapists and yoga therapists and occurred frequently in case discussions and meetings. These included starting and ending sessions on time, therapeutic touch, sexual attraction, physical safety, financial arrangements, and email or phone contact outside the yoga sessions. The group also explored boundary issues from an internal perspective. For example, many of our yoga therapists are highly empathic and at times adopted their clients’ physical and emotional issues as their own, a phenomenon referred to as *emotional contagion*. Yoga therapists were open to creating and reinforcing internal boundaries to protect themselves from or to ameliorate emotional contagion and to release emotional residue after a session.

Therapeutic sequencing. In this first phase of supervision, several trainees shared an impulse to introduce as many tools as possible early in treatment in an effort to be helpful and to win client confidence. This impulse is characteristic of many beginning yoga therapists and psychotherapists and typically relates to a need to demonstrate

one’s clinical acumen. The group examined methods of sequencing clinical strategies so that therapeutic tools could build upon one another over time. As time progressed, our therapists were able to integrate the awareness that “less is more” in a yoga therapy session. They benefited from observing the improvements that occurred when they focused on greater depth with fewer tools. They learned that clients integrated the work better when smaller and more subtle interventions were introduced and practiced over several sessions.

Adjunct therapist interaction. The Center for Integrative Yoga Therapeutics adopts a holistic approach to treatment and supports collaboration within a treatment team. The group discussed formal structures for interacting with other medical/therapeutic practitioners. Typically, trainees communicated with referring physicians, psychiatrists, and psychotherapists and also with medical doctors as warranted. Exchanges were always discussed with and approved by clients, who signed appropriate release forms. In several instances, the therapist’s (and group’s) proposed directions for further treatment differed from those of the client’s referring or adjunct therapist. When this was the case, our therapists received support for managing their resulting frustration or concern so that it did not affect the client’s treatment. We explored strategies for resolving these differences in a way that helped preserve clients’ therapeutic alliances with the treatment team.

Case re-presentations. During this phase, several trainees requested the opportunity to present a case for the second time. This typically occurred with more challenging cases. We developed a protocol for case re-presentation. Using the procedures in Appendices B and C as starting points, we amended the case presentation format to include the following:

- Past issues discussed in group supervision sessions
- Goals since the previous presentation
- Methods to promote client change, observation, attention, mindfulness, etc.
- Feelings of success and/or roadblocks to goal
- Themes, both recurring and new
- Boundary issues
- Countertransference (reactions to the client) on the part of the yoga therapist

Phase I process themes

During the first 6 months, several group process issues emerged. This helped establish directions for *svadhyaya*, or self-study. The most prevalent process theme during all 3 phases of supervision involved the trainee’s discomfort with the supervision experience. Most therapists reported acute

² “Container” is a term commonly used in psychotherapy and refers to the frame or structure of a session, which is important in establishing a basic sense of safety and boundaries.

performance anxiety before, during, and after the presentation of cases. They described intense feelings of self-consciousness and inadequacy while presenting in front of their colleagues and supervisor and when offering feedback to their colleagues. This is not unusual and is frequently experienced by beginning psychotherapists who are new to the process of supervision. Several variations on the theme of performance anxiety emerged.

Reactions to the supervision experience: When presenting cases and sometimes while offering feedback, trainees reported a strong sense of being “exposed.” They identified intense feelings of vulnerability and self-judgment and expressed a need to be validated for their performance. At the outset of supervision, this need for positive reinforcement made it difficult for participants to receive helpful suggestions from the group or to offer them to colleagues. At the same time, the therapists’ self-judgment also made it difficult for them to hear and integrate positive feedback. To establish a baseline for safety, the group adjusted our case presentation format by structuring how and when feedback could be offered. We built in reflection and listening time for presenting therapists, during which they were silent while their colleagues discussed their case (see Appendices B and C). This interlude allowed therapists the chance for reflection and self-modulation rather than reaction. It helped them better sit with, process, and tolerate their discomfort.

Together, we developed a series of self-study questions to monitor the therapists’ challenging internal response to supervision. These questions included, Does my response include self-compassion and compassion toward my colleagues? Can I maintain a dynamic inner and outer dialogue about my experience? Can I engage in rich questioning at the individual and the group level?

In light of the emerging need for affirmation before constructive feedback could be given and received, the group addressed the question, Why are we here? With guidance from Forbes, the group explored ways to use practices from the yoga and mindfulness traditions (meditation, breathwork, and restorative yoga) to lessen feelings of performance anxiety and self-judgment. We redefined the principle of supervision as neutral rather than negative. In response, trainees began to observe, sit with, and sometimes verbalize their need for validation when it occurred. They learned to monitor and reduce self-critical impulses. They became better able to hear and integrate positive and constructive feedback. They were also reminded of, and made use of, the option to communicate with their supervisor and/or colleagues if self-judgment lingered long after the supervision session ended.

Phase II: The Second 6-Month Supervision Period

In the second phase of supervision, the group recommitted to the established container of supervision. We addressed didactic themes similar to those in Phase I, including boundaries and therapeutic sequencing. We also revisited earlier process themes, such as feelings of exposure and performance anxiety in supervision. Finally, we encountered new themes, such as transference and countertransference (defined below).

Phase II didactic themes

Boundaries, revisited. In Phase II, the group began to engage with the concept of boundaries in a more sophisticated way. Trainees’ steady development of internal boundaries (which included discernment and inner cohesiveness) enabled them to trust in the external boundaries of a session, particularly with challenging clients. Boundaries became simultaneously less rigid and more sophisticated. Some boundary themes included the developing ability to detect and recover from emotional contagion in a variety of situations. Trainees also explored ways to empower clients by giving them a more active role in the process of yoga therapy as time progressed. Trainees also began to encourage clients to take notes about session interventions as a means of internalizing the therapeutic work.

Evaluation of client progress. As more of our trainees presented cases for the second time, they gained a better sense of their trajectory of growth and that of their clients. The group shared methods for assessing clients’ progress and setting new session goals. A previous shared pattern among group members included looking for obvious or “gross” changes in clients; at this point in the supervision process, the yoga therapists were better able to note and reinforce subtle changes in client functioning and awareness. This helped the therapists support and validate these changes, which in turn strengthened the therapeutic alliance.

Therapeutic sequencing, revisited. Trainees became increasingly fluent in providing didactic information, offering interpretive insights, reframing therapeutic themes, and introducing new therapeutic tools to clients at a digestible pace. Collectively, they developed (and observed one another develop) a greater facility for moving between macro (bigger picture) and micro (detail focus) observations and interventions in client sessions. They were also able to incorporate a more elegant interplay between activity and reflection. This allowed for better assimilation of subtle awareness on the part of both client and therapist.

Adjunct therapist interaction, revisited. The yoga therapists grew more comfortable in their interactions with referring and adjunct practitioners. They became willing to take an active role in case collaboration: they asked questions of referral sources related to medication and other issues and shared session information when appropriate. The group also reviewed the use of client consent forms.

Client transference. This phase featured many case discussions regarding transference (clients' reactions to the yoga therapist or clients bringing interpersonal *samskaras*, or patterns, into treatment). The supervision group examined a variety of ways for yoga therapists to detect when transference was occurring. For example, a client might demonstrate excessive idealization or disdain of the yoga therapist. The group used experiences from multiple cases and hypothetical examples to develop an arsenal of yogic tools to help themselves and their clients manage and learn from transference experiences.

Therapist countertransference. The group also began to address countertransference issues. Countertransference refers to the yoga therapist's reactions to the client or the client's elicitation of the yoga therapist's *samskaras*, or patterns in treatment, as a function of the client-therapist dynamic.¹⁸ Trainees examined strategies to detect, observe, and interpret their countertransference issues to clients. When they were able to notice countertransference, they could prevent the avoidance or disapproval of a client from occurring. Occasionally trainees noted acute feelings of low self-esteem following a session. When they observed and contained these feelings, they could question whether the client was struggling with similar emotions. Together, trainees began to conceptualize their reactions to clients not as a sign of incompetence, but as a signal to ask themselves a series of important self-study questions. These questions included, Are my expectations of the client too high? Could the therapeutic alliance benefit from more compassion? The therapists began to recognize the evocation of countertransference reactions as a call to develop better internal boundaries, mindfulness, and impulse control. Furthermore, the therapists learned how to gracefully contain, process, interpret, and reflect on their countertransference responses by using them as guides for future treatment.

Phase II process themes

Reactions to supervision experience, revisited. During the second 6-month supervision period, the trainees experienced a distinct evolution in relationship to their process themes. Their feelings of acute anxiety, self-consciousness, inadequacy, and exposure began to diminish. As a group and individually, trainees were better able to tolerate these feelings during and after presenting cases. They were significantly more receptive to integrating both positive feedback and con-

structive suggestions. They also began to seek out opportunities to present challenging cases and tolerated the accompanying concern that they were "not doing a good job."

Performance pressure, revisited. The yoga therapist trainees explored "good student" and "good teacher" dynamics. They considered whether it was possible (and tolerable) to be a "good enough" yoga therapist. The group examined the construction and use of the "yoga teacher persona" that beginning teachers and therapists often adopt as a protective mechanism. This persona requires constant presentation of an equanimous attitude, a soft and melodious voice, the use of traditional yogic metaphors to describe postures, and maintenance of an outwardly cheerful demeanor. For some trainees, this persona created a sense of distance from difficult therapeutic work. Over time, however, the effort to rigidly maintain all aspects of this persona became energy draining and hindered the ability to connect with clients more authentically. The group acknowledged that the creation of this persona might be a beginning step in learning to teach, but that in the process of maturation, yoga teachers and therapists can discard this persona and become more authentic and present. When trainees were able to be themselves without worrying about being "nonyogic," they became more present. The group discussed how this type of presence models vulnerability and authenticity for clients. Witnessing this vulnerability and authenticity helped clients reduce their own tendencies toward perfectionism and other self-destructive relational schemas.

Parallel process issues. The supervision group also examined the context of parallel process issues between therapist and client. *Parallel process* refers to a phenomenon in which the therapist's personal impulses and struggles mirror those of the client. In case discussions, trainees were able to recognize instances in which the challenging emotions that they experienced in and outside of the context of yoga therapy sessions seemed to mirror their clients' challenges. Trainees were able to note ways in which their emotional growth and ability to process, contain, and transform difficulties that arose within the therapeutic relationship helped clients do the same. One example relates to the evolution of boundaries: the therapists grew more willing to acknowledge their own struggles with boundaries. Consequently they became more understanding of clients who did not evidence healthy boundaries and more engaged in helping clients develop them.

Phase III: The Final 6-Month Supervision Period

The third and final phase of supervision was characterized by trainee maturation. As a group they continued to practice, internalize, and articulate lessons learned in the

first 2 phases. The group addressed several issues similar to those in Phases I and II, albeit with a higher level of awareness and insight.

Phase III didactic themes

Evaluation of client progress, revisited. Trainees gained more ease with allowing clients to evolve at their own pace. When client progress seemed slow, trainees were better equipped to note areas of subtle growth and to conceive of delays as therapeutic rather than reflective of a lack of performance or ability. This realization gave the group an opportunity to reinforce the role of the therapist as a guide who watches and observes the client's process and creates a safe and supportive environment where change occurs at its own organic pace. Trainees personalized the pace of client progress and responses to treatment less frequently. In addition, they were better able to calibrate their interventions to address clients' moment-to-moment needs.

As this phase evolved, the group identified a shared tendency to prematurely encourage clients to accept full authority for their transformation. The group contemplated the question, How can the therapist artfully calibrate handing over power to the client in a way that feels gradual and safe? It is worth noting that these questions indicated a parallel process for our therapists. As they began to help clients take on more autonomy in their own growth, our therapists took on a more active role in the supervision sessions. They began to actively solicit feedback, accurately and insightfully frame therapeutic dilemmas, and offer helpful reflections and solutions.

Parallel process, revisited. Trainees developed increased awareness of and patience with parallel process issues and themes. As an example, they examined their frustration with some clients' valuation of the "exercise" element of yoga over mindfulness-based practices, such as restorative yoga. Here, our therapists were able to distinguish ways in which they had similar challenges with self-care. They were able to note these issues in their self-study and to address them with self-compassion. This made trainees more understanding and artful in encouraging clients to do the same. The therapists were also better able to conceptualize boundaries and self-care as processes that could develop, both in themselves and in clients, over time and with reflection.

Therapeutic sequencing revisited. Trainees explored their difficulty with recognizing when clients did not understand yogic and/or mindfulness concepts. They were able to see when they used yogic jargon and understand how this created client confusion and therapeutic distance. The group worked to distill important concepts into easily comprehensible terms for the yoga layperson. As homework, therapists were asked to delineate several different ways of articulating and communicating tools in the

Integrative Yoga Therapeutics system.

The group also explored using the image of a learning laboratory with clients. This learning laboratory model gave clients an opportunity to explore yogic tools, use their awareness to evaluate these tools, and offer feedback to the yoga therapist. This helped trainees and clients experience the therapeutic work as collaborative and experimental, which removed many of the "good client" and "performance pressure" tendencies for both therapist and client. As a result, clients were empowered to take a more active role in their healing process. In many ways, the clients' ability to adopt a learning laboratory approach paralleled our therapists' willingness to engage in the laboratory aspect of yoga therapy and supervision and to see the process as creative, dynamic, nonhierarchical, and collaborative.

Client transference. During this phase, several trainees worked with more challenging clients, such as those with severe mood disorders (for which they took multiple medications and were also in treatment with a psychiatrist and/or psychotherapist). Some also had secondary diagnoses of chronic pain disorders such as fibromyalgia. The group explored a phenomenon known as *projective identification*. This term refers to the tendency for individuals to transfer their negative emotions onto the therapist in an effort to unconsciously learn how to cope with and contain these feelings. Through group supervision, trainees explored methods to detect this dynamic and learned skills to respond thoughtfully and mindfully. The supervision group discussed the significance of projective identification in diagnosis, treatment, and self-study.

Therapist countertransference. Trainees also examined another countertransference theme: righteousness regarding their expectations of clients. The group revisited the Pre-Supervisory Survey, which revealed their expectations that yoga therapy clients have healthy boundaries, are committed to the work, recognize their ability to change, are willing to change, and are present. Trainees acknowledged more fully how challenging these qualities are even for yoga therapists accustomed to self-examination, let alone clients for whom such self-study is a new enterprise. They also recognized that clients need and seek guidance in these areas. At this juncture, they benefited from observing one another struggle with and work through these high expectations. The group perspective, and the repetition of this theme among many different therapist case presentations, helped trainees conceptualize the development of boundaries and self-care as developmental skills. The group acknowledged that one of their primary roles is to model these behaviors as a means of helping clients develop these skills. Individually and as a group, the therapists began to cultivate greater compassion for their clients and to integrate this compassion into treatment.

Phase III process themes

Reactions to supervision experience, revisited. In this phase of supervision, the yoga therapist trainees exhibited less self-consciousness and self-criticism. They experienced less frequent anxiety and were able to regulate it when it occurred. The quality of peer supervision and feedback grew markedly as each recognized, appreciated, and actively sought out constructive collegial feedback.

Performance pressure, revisited. Trainees became better able to distinguish client progress from their sense of self-efficacy. They recognized that the process of personal transformation can be slow and serpentine. They became more compassionate with themselves and with their clients, which enabled them to tolerate therapeutic plateaus and allow the process of yoga therapy to move at its own pace. Emphasis moved from how to use specific tools and techniques to the art of “watching” clients on multiple levels (e.g., physical, emotional, spiritual). The therapists were better able to detect and build upon subtle therapeutic opportunities in sessions. This, in turn, helped clients evolve from effort to ease in their own practice.

C. Post-Supervision. At the conclusion of the group

supervisory period, we readministered the perceptions, attitudes, and beliefs portion of the Pre-Supervisory Survey to capture any variance in the therapists' views of yoga therapy pre- and postsupervision. Table 3 outlines their responses in paraphrased form.

These responses demonstrate a growing maturity regarding the trainees' expectations of themselves and of their clients. Although still tinged with some idealism, trainees' postsupervision expectations accommodated a conceptual framework of yoga therapy and the therapeutic relationship as catalysts for clients to learn boundaries, accept responsibility for treatment, and provide the yoga therapist with honest feedback.

Comparison of the Pre- and Post-Supervisory Survey responses (Tables 1 and 3 and Appendix D) indicated that the IYTAT participants' responses after the group supervision period reflected a different and increasingly nuanced understanding of yoga therapy. Postsupervision review suggested a growing comfort with challenge and difficulty as inherent components of yoga therapy. The process of watching one another experience similar insights through struggling with the imperfection and evolution of therapeu-

Table 3. *Post-Supervisory Survey*

What are the most important roles and responsibilities of a yoga therapist?	What are the most important roles and responsibilities of a yoga therapy client?	Please describe the qualities and characteristics of an ideal relationship between yoga therapist and client:
<p>A yoga therapist should be able to</p> <ul style="list-style-type: none"> • create a safe and healthy container and boundaries for/with the client • be present with the client: listening, observing, empathizing, respecting, engaging, with patience and trust • educate, facilitate, and guide the client's ability to achieve and develop their own insight and power to self-heal • allow experimentation and exploration to guide the work, creating the therapeutic path along with the client • cultivate ongoing skills and working knowledge of yoga, anatomy, and the mind-body connection • welcome each discovery with nonjudgment • maintain strict confidentiality • recognize what is outside the bounds of yoga therapy; refer the client to appropriate providers • coordinate with other treating providers, with the client's consent • model a good practice of self-care • maintain a practice of self-study and self-awareness • practice the <i>yamas</i> and <i>niyamas</i> especially as they relate to clients 	<p>Yoga therapy clients should</p> <ul style="list-style-type: none"> • come with openness, willingness to explore, be self-compassionate, be nonjudgmental, observe direct experience, honor the messages/language of their own body (though not always nor all at once) • respect boundaries • be and practice (have already taken a big step in seeking the work) • know that it's OK not to take full responsibility for their healing—yet, that too, can be rewarding and revealing • be willing to practice the work between sessions and provide feedback to the therapist • trust and be honest with the yoga therapist • advocate for their own needs and define goals and objectives for yoga therapy • have permission to be active or passive and determine pace of progression • should not expect the therapist to “fix” them, but rather see the therapist as an educator providing them with the tools to “fix” themselves 	<p>The ideal relationship between a yoga therapist and client is characterized by</p> <ul style="list-style-type: none"> • openness, good communication • honesty, integrity, trust • humor, empathy, presence • patience, dedication • respect, nonjudging, compassionate observation • clarity about boundaries • faculties of the therapist and empowerment of the client to create clients' ability to do the work themselves • honoring of the process • an interest in learning something new, exploring, and testing • flexibility in recognizing and accepting when something needs to be changed • an environment that allows for failure • acknowledgment and support of progress • a willingness by both to be responsible in doing their part • recognition that the relationship is not static and is always evolving • potential for a growthful relationship • learning that relationships with clients are so different; some are easy and some are difficult

tic work helped trainees learn skills to work effectively with both simple and complex therapeutic issues.

The Post-Supervision Survey asked the therapists to reflect on the nature of the skills they learned in group supervision and to offer feedback on the effectiveness of the group supervision structure and format. All the yoga therapists participating in the Post-Supervision Survey said they gained both didactic knowledge and self-awareness from the group supervision experience. A sample quote follows:

“I think we developed a well-rounded but still foundational set of tools in our formal teacher and yoga therapy training. The opportunity to discuss specific clients and our approaches within the setting of IYTAT was kind of like upgrading the tool box: better tools, and a deeper box to then begin to fill again. In formal training, we addressed the self-knowledge issues, but with IYTAT, we got to see how those issues play out in a real setting so as to better appreciate the complexity and importance of how boundaries and our own self-awareness can make the dif-

ference between getting stuck in a session and successfully collaborating toward a growthful outcome.”

We also asked participants to discuss how the format used for supervision sessions influenced their learning process and whether they would choose to change anything. Our participants reflected that the supervision framework was helpful in keeping the group on task while still allowing new questions and comments. They felt that the structure was integral to the group’s success. They reported that the format allowed time for listening and assimilation, for correlation of their peers’ experiences with their own areas of discomfort or hesitancy, and for integration of Forbes’s insights and feedback. They found the supervision notes helpful for tracking themes over time and for reflecting on their progress and growth.

Finally, the Post-Supervision Survey addressed the therapists’ internal experience of clinical group supervision. Table 4 illustrates their paraphrased responses.

The yoga therapist trainees benefited from group super-

Table 4. Post-Supervisory Survey

What are two or three things that you learned from your participation in the IYTAT?	What was your participation in IYTAT like for you emotionally?	What did you gain from this modality of learning that you could not have gained without it?
<p>I learned</p> <ul style="list-style-type: none"> • honest, open, compassionate feedback from peers and supervisor is invaluable to the growth of a yoga therapist • how better to approach client sessions: to create a container for experimentation, trial and error (and being OK with the “error”), and partnered exploration toward client’s therapeutic goals • if we are to suspend our own stories (as yoga therapists), new opportunities can evolve • we can heal injury, both emotionally and physically, through being present • we can also cultivate a sense of joy and gratitude by deepening our ability to connect to our bodies • how to better modulate my own energy by setting clear boundaries for myself and the client • the benefits of being able to share questions, issues, and small victories with a team of people even if the victories were of new insight distilled from (sometimes uncomfortable) discussions • if I found myself wanting to put a positive spin on an event or if I found myself defensive, there usually was something below the surface worth examining, and the group supervision was a way for me to examine that more closely so that I did not continue to bring my “own stuff” into client sessions 	<p>In this experience</p> <ul style="list-style-type: none"> • the work brought up feelings of inadequacy and self-doubt so there was some discomfort in presenting to the group, even though we were working within a supportive setting • initially I found my participation challenging emotionally • at first we were anxious about putting out work that would be critically reviewed in front of our teacher and peers, and encountered the fear of “being wrong” • the group developed such a supportive environment for learning without judgment that our anxiety turned into excitement to share and learn from our teacher and colleagues • it was complex and beneficial: the close camaraderie and safety net that the group supervision presented made a huge difference to the quality of our work, yet at times meant examining difficult issues. This accounts for the value of group supervision: addressing discomforts, competitive impulses, the desire to project an image of a “good student” out in the open meant that ultimately our individual strengths and weaknesses contributed to our learning 	<p>I gained</p> <ul style="list-style-type: none"> • experience working with real clients in a one-on-one setting for multiple sessions; the support provided by the group and this structured setting was invaluable • the ability to not feel alone, which was of great benefit • perspective: we could not have learned what we did without the group supervision, the preparation for cases, and the participation in group discussion and analysis of cases. Moving from the theoretical to the application with continued supervision seems essential for growth as a therapist • the ability to work with special populations with whom there is so much more to consider that just putting together a yoga sequence • the ability to put group thoughts into practice, and then return to the issue in subsequent meetings was an amazing way to learn • the ability to learn the nuances of client work: often our pre-presentation reflections would be radically changed by learning, through supervision, that the true focus was different. I would not otherwise have learned how to think about clients in this way. I gained a network and group supervision while working with private clients, especially when those clients bring vulnerabilities, emotional issues and trauma (physical/ emotional)

vision in many ways. They became more aware of their internal beliefs and processes and learned to offer constructive, collegial feedback. They began to embrace discomfort as a tool for personal growth and professional development rather than avoid it. They began to rely less on prescriptive interventions and learned to engage clients from a knowledgeable yet spontaneous and fully present place. They developed a robust set of tools and mechanisms with which to meet the challenges that often occur in the deep work of Integrative Yoga Therapeutics.

Discussion

At the close of this clinical group supervision process, the authors posed the following questions: Is group supervision a valid and effective structure within the context of a yoga therapy training program? Are there any negative effects of this form of supervision for yoga therapy apprentices? What does group supervision offer that other supervisory structures (such individual or peer supervision) may not?

At the outset, this process was extremely challenging for our yoga therapists-in-training from both didactic and self-study perspectives. It is possible that some beginning yoga therapists, particularly those with no prior experience with supervision or with already high levels of performance anxiety or difficulty with group dynamics, would need additional individual support to successfully navigate group supervision. Trainees' discomfort cannot be avoided, and it occurs in the service of personal and professional growth. It is likely that individual supervision would not trigger as much of this productive discomfort and that issues that arose in group supervision would not be addressed. Despite the initial emotional discomfort, the authors and the IYTAT group unanimously endorse the NESIYT model of clinical group supervision as a highly effective modality for imparting unique didactic information and experiential training to beginning yoga therapists. To illustrate, we include select quotes from our Post-Supervision Survey here:

“Cultivating the art of being comfortable in putting out my work for critical feedback, candidly presenting my approach in the IYT session, recognizing the challenges I faced, and then being open to receiving the feedback from my peers and from Bo are essential. In so doing, I could then take advantage of the real learning that comes from an honest exploration of the work.”

“Seeing myself present in front of others and seeing similar issues from a distance when others presented their cases gave me a vantage point and insight that would otherwise not have been available to me. I would not want to do private work with clients—especially clients who are

drawn to the holistic approach of integrative yoga therapy—without the benefit of a structured network of people with whom to discuss the work in a group setting.”

We believe that the NESIYT model of group supervision helped trainees evolve personally and professionally in significant ways that differ from peer and individual supervision. Our Post-Supervisory Survey indicated that yoga therapist trainees made significant gains in relation to didactic learning and clinical skills. Gains in learning themes included negotiated interaction with referring and other adjunct therapists, therapeutic sequencing, evaluation of client progress, awareness of the need to establish and maintain boundaries, and navigation of client transference and therapist countertransference. Gains in relation to process themes encompassed a softening of performance anxiety and self-judgment in relation to the process of supervision, ability to obtain additional practice and learning by watching colleagues wrestle with similar therapeutic themes and issues, and the ability to give and receive collegial feedback.

The therapists' concluding comments, as well as the discussion of the themes during the three phases of supervision, reinforced the importance of sharing multiple and iterative examples of challenges and issues through the group's structure. A key element of therapist learning came from experiencing themes not as personally unique, but as shared issues and natural stepping stones in the development of a sophisticated and varied set of strategies for doing yoga therapy.

The NESIYT model of group supervision also fostered the yoga therapist trainees' connection to one another. It established a framework that many of them continue to use for seeking out peer supervision in their therapeutic work. Accordingly, we recommend structured group supervision as an effective element of yoga therapy training programs. We hope that this documentation of the emergence of didactic and process themes in our group supervision cohort provides a useful blueprint for other yoga therapy training programs.

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Appendix A

NESIYT Clinical Group Supervision Model Integrative Yoga Therapeutics Apprenticeship Track Pre-Supervisory Survey for Participants Entering the NESIYT Yoga Therapy Program

1. What are your personal and professional goals for participating in the Integrative Yoga Therapeutics Apprenticeship Track?
2. What self-study themes do you anticipate working with this year in the Track (Samskaras, boundaries, etc.)? In what ways?
3. How can the Track best facilitate your self-study and realization of your goals?
4. What forms of yoga have you or do you practice?
5. What yoga/mind–body teacher training programs have you completed?
6. What yoga/mind–body teacher training programs are you in the process of completing?
7. How many one-on-one yoga sessions have you completed? Please describe the nature of these sessions.
8. What do you think are the most important roles and responsibilities of a yoga therapist? You may use single words, descriptive phrases, metaphors, or a paragraph to answer.
9. What do you think are the most important roles and responsibilities of a yoga therapy client? Again, you may use single words, descriptive phrases, metaphors, or a paragraph to answer.
10. How do you think Integrative Yoga Therapeutics differs from each of the following:
 - a) Individual yoga instruction
 - b) other “alternative” therapies (e.g., acupuncture, homeopathy)
 - c) other schools of yoga therapy
 - d) bodywork (e.g., massage, shiatsu, rolfing)

11. Please describe the qualities and characteristics of an ideal relationship between a yoga therapist and client.
12. Do you have any further reflections on proficiency—a combination of competence, knowledge, & confidence—in your learning and practice of Integrative Yoga Therapeutics?
13. What are your personal and professional goals for participating in the Integrative Yoga Therapeutics Apprenticeship Track?
14. What self-study themes do you anticipate working with this year in the Track (Samskaras, boundaries, etc.)? In what ways?
15. How can the Track best facilitate your self-study and realization of your goals?
16. Please rate your proficiency in the following areas:
 - a) New client intake
 - b) Designing therapeutic sequences
 - c) Communicating with clients
 - d) Instructing active yoga therapeutics
 - e) Instructing Restorative Yoga
 - f) Verbal assisting of clients
 - g) Physical assisting of clients
 - h) Leading therapeutic meditation
17. Please list your proficiency with the following populations:
 - a) Spinal anomalies
 - b) Fertility issues
 - c) Pregnancy
 - d) Anxiety, insomnia, depression
 - e) Addictions
 - f) Chronic pain disorders
 - g) Elderly clients
 - h) Injury prevention and rehabilitation
 - i) Injuries
 - j) Eating and body image disorders
 - k) Performance enhancement (athletic performance)
 - l) Immune disorders
 - m) Nervous system disorders
 - n) Osteoarthritis
 - o) Hypermobility/joint laxity
18. Do you have any further reflections on proficiency—a combination of competence, knowledge, & confidence—in your learning and practice of Integrative Yoga Therapeutics?
19. What are your personal and professional goals for participating in the Integrative Yoga Therapeutics Apprenticeship Track?
20. What self-study themes do you anticipate working with this year in the Track (samskaras, boundaries, etc.)? In what ways?
21. How can the Track best facilitate your self-study and realization of your goals?
22. Finally, please ask (and answer) here any missing questions that would have been helpful to ask on this survey and/or any additional comments or questions that you have as you begin the IYTAT.

Many thanks for your thoughtful participation! Namaste

Appendix B

NESIYT Clinical Group Supervision Model Integrative Yoga Therapeutics Apprenticeship Track Case Presentation & Discussion Framework

In order to facilitate productive case discussions, where both the presenter and his or her colleagues in the Track learn deeply, this framework distributes responsibility for important case discussion roles (presenter, facilitator, note-taker), allowing all Track members to participate in many ways.

Before the Case Discussion:

- **Presenter** prepares a short written summary (1–2 pages) of the case, including the following. Please do not name the client in this document, or use a pseudonym:
 - key therapeutic issues (see Clinical Notes template for ideas)
 - example sequence (just a typical one, outlined briefly)
 - your main questions for discussion—what you'd like to learn about/from this case.
- **Presenter** e-mails summary to colleagues *at least 72 hours prior* to IYTAT meeting.
- **IYTAT participants** read the summary thoroughly before the meeting. Please print and bring a copy with you to the meeting.

At the Case Discussion (~40+ minutes total):

Roles (besides presenter—see next page for detailed process):

- **Facilitator:** manages the time, invites contributions from a range of IYTAT participants, and keeps the case presenter from dominating the conversation
- **Note-taker:** writes down any key insights about the case from the discussion and gives those notes to the presenter at the end
- **Supervisor:** guides the case clinically by asking questions, etc.

After the Case Discussion:

- **Note-taker** gives notes to **presenter**.
- **Presenter** revises his or her summary of the case to include insights, solutions, and next steps (if continuing to work with the client).
- **Presenter** sends an updated summary to Bo and the group by e-mail **within 72 hours** of the case discussion.

Appendix C

NESIYT Clinical Group Supervision Model Integrative Yoga Therapeutics Apprenticeship Track

Detailed Case Discussion Process (~40+ minutes total):

1. **Case Presenter** introduces case very briefly, 1–2 **minutes**: focus on the essence and what the case presenter feels s/he wants or needs to learn, or can't yet see, or what is liminal about the case.
2. **Questions**: ~10 minutes (facilitator checks with group before moving on)

Facilitator invites questions from *IYTAT participants and supervisor*.

Case Presenter answers. Everyone has read the summary, so these questions should go further, not resummairize the case.

Questions could include:

- What happened when...
- How did the client respond to ...
- What did you observe (content, essence) about the client's ...
- Questions about the essence and form of the sessions...

3. **Brainstorming**: ~ 10 min. (facilitator checks with group before moving on)

IYTAT Participants and Supervisor brainstorm about the case (interpretation, diagnostic issues, etc.) with *Facilitator's* guidance. *Case Presenter* watches and listens. At this point, the discussion *does not address the Presenter directly* — it is an important opportunity for the presenter to sit back and listen without having to be in the spotlight.

Brainstorming at this stage could include such topics as:

- What is the therapist bringing to the dynamics of the case?
- What is the client bringing to the dynamics of the case?
- What “Deep Visceral Body” issues might be important, either in the therapist or the client?
- How might the therapist solve his or her challenge/question/puzzle?
- More on the liminal space the therapist might be in

4. **Open Discussion with Case Presenter**: ~5 minutes
(facilitator checks with group before moving on)

Facilitator first invites Case Presenter back into the conversation to reflect on what s/he has heard, any new insights, etc.

Open discussion follows.

5. Reflection on Themes Raised in the Case: ~ 5 min.

Group discusses any broader, more widely applicable, or important themes that emerged from the case discussion. The Supervisor might, on occasion, have some thoughts or questions for us here...

6. After the Case Discussion:

- *Note-taker* gives notes to *presenter*.
- *Presenter* revises his or her summary of the case to include insights, solutions, and next steps (if continuing to work with the client).
- *Presenter* sends updated summary to supervisor and the group by e-mail. This summary should be kept separate, and at the front of the document, so readers need not scroll through.
- The *summary should not be a reiteration of the presenter's notes*, but rather a representation of what they have taken from the supervision experience, what they learned, and what they will continue to work on (i.e., next steps) in terms of gaining a fluency with the issues that came up.
- *The summary is due 72 hours after the session.*

7. Contacting Bo in between supervision sessions:

If something occurs in between supervision and you would like some support with your client issue, you can contact the supervisor. Please make sure, before doing so, that you have taken the following steps, below. This will ensure that you are continuing to use the skills you have acquired during supervision and also not requiring the supervisor to obtain additional information from you in responding.

- *CIYT yoga therapist* identifies that an issue has come up in therapy.
- *Before emailing* the supervisor, the yoga therapist should review (and prepare in writing) the following questions:
 - What is the brief history of the relationship with the client?
 - If this is a client intake, include the intake at the bottom of the email.
 - What are the major issues (both clinical and structural, e.g. boundaries, etc.) that the client is bringing to the case?
 - Is there anything that you, as a yoga therapist, have not done early on (either structurally or clinically) and now feel would be challenging to do, or that you need help on gracefully doing?
 - What response would you like to give, and why?
 - What might be the consequences of this response, both positive and negative, if you try this (both for the client and for the therapeutic relationship)?
 - What specific questions do you have for the supervisor, i.e., what input would help you the most (rather than asking, "What should I do?")
 - Have you thought of consulting with a colleague before emailing the supervisor? If so, what were the results of that conversation (briefly)? If not, why not?

Appendix D

Comparison of Pre- and Post-Supervisory Survey Responses (Paraphrased)

Question	Pre-Supervisory Survey Responses	Post-Supervisory Survey Responses
	<p>A yoga therapist should be able to</p> <p>create a safe and healthy container for clients' growth; maintain healthy boundaries; be consistent and reliable; be deeply present; be empathic; be flexible in adapting to client issues and to the process of the therapy session; observe and integrate both obvious and subtle cues from the client; receive constructive feedback from clients; empower the client to take an active role in his/her health and well-being; demonstrate a thorough beginning knowledge of Integrative Yoga Therapeutics.</p>	<p>A yoga therapist should be able to</p> <p>create a safe and healthy container and boundaries for/with the client; be present with the client: listening, observing, empathizing, respecting, engaging, with patience and trust; educate, facilitate, and guide the client's ability to achieve and develop their own insight and power to self-heal; allow experimentation and exploration to guide the work, creating the therapeutic path along with the client; cultivate ongoing skills and working knowledge of yoga, anatomy, and the mind-body connection; welcome each discovery with nonjudgment; maintain strict confidentiality; recognize what is outside the bounds of yoga therapy; refer the client to appropriate providers; coordinate with other treating providers, with the client's consent; model a good practice of self-care; maintain a practice of self-study and self-awareness; practice the <i>yamas</i> and <i>niyamas</i>, especially as they relate to clients.</p>
<p>What do you think are the most important roles and responsibilities of a yoga therapist?</p> <p>What do you think are the most important roles and responsibilities of a yoga therapy client?</p>	<p>A yoga therapy client should</p> <p>take responsibility for his/her healing and growth; be ready to make a change; maintain and respect healthy boundaries; be present; be willing to change their personal narratives; have trust in themselves and the yoga therapist; be open-minded to the possibility of growth and change; recognize his/her ability to grow; be patient; communicate honestly about his/her presenting issues.</p>	<p>A yoga therapy client should</p> <p>come with openness, willingness to explore; be self-compassionate; be nonjudgmental; observe direct experience; honor the messages/language of her/his own body (though not always nor all at once); respect boundaries; be and practice (s/he has already taken a big step in seeking the work); know that it's OK not to take full responsibility for their healing yet—that too can be rewarding and revealing; be willing to practice the work between sessions and provide feedback to the therapist; trust and be honest with the yoga therapist; advocate for their own needs and define goals and objectives for yoga therapy; have permission to be active or passive and determine pace of progression; should not expect the therapist to "fix" them but rather see the therapist as an educator providing them with the tools to "fix" themselves.</p>
<p>Please describe the qualities and characteristics of an ideal relationship between yoga therapist and client.</p>	<p>The ideal relationship between a yoga therapist and client is characterized by</p> <p>appropriate boundaries; open communication between both parties; a clear sense of roles and responsibilities; patience with the process of yoga therapy; a partnership of two valued systems of expertise: the expertise of the therapist in safe, therapeutic, and life-enhancing yoga practices; the expertise of the client in self-reflection and intention toward self-appreciation; a mutual willingness to explore uncharted territory; mutual trust.</p>	<p>The ideal relationship between a yoga therapist and client is characterized by</p> <p>openness; good communication; honesty, integrity, trust; humor, empathy, presence; patience, dedication; respect, nonjudging, compassionate observation; clarity of boundaries; the faculties of the therapist and empowerment of the client creating the client's ability to do the work themselves; honoring of the process; an interest in learning something new, exploring, and testing; flexibility in recognizing and accepting when something needs to be changed; an environment that allows for failure; acknowledgment and support of progress; willingness by both to be responsible in doing their part; recognition that the relationship is not static and is always evolving; thinking of the most potential for a growthful relationship; recognizing that yoga therapist-client relationships differ—some are easy and some are difficult.</p>

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Issues in Yoga Therapy

The Use of Yoga in Specialized VA PTSD Treatment Programs

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Abstract

Background: Posttraumatic stress disorder (PTSD) is a chronic, debilitating anxiety disorder that is highly prevalent among U.S. military veterans. Yoga, defined to include physical postures (asana) and mindfulness and meditation, is being increasingly used as an adjunctive treatment for PTSD and other psychological disorders. No research or administrative data have detailed the use of these services in Department of Veterans Affairs' (VA) 170 PTSD treatment programs. **Methods:** One hundred twenty-five program coordinators or designated staff completed an 81-item survey of their program's use of complementary and alternative medicine modalities in the past year. This report describes data from a subset of 30 questions used to assess the prevalence, nature, and context of the use of yoga, mindfulness, and meditation other than mindfulness practices. **Results:** Results revealed that these practices are widely offered in VA specialized PTSD treatment programs and that there is great variability in the context and nature of how they are delivered. **Conclusions:** Understanding how yoga is used by these programs may inform ongoing efforts to define and distinguish yoga therapy as a respected therapeutic discipline and to create patient-centered care models that mindfully fulfill the unmet needs of individuals with mental health issues, including veterans with PTSD.

Key Words: Yoga, PTSD, yoga therapy, mental health

Introduction

Posttraumatic stress disorder (PTSD) is a chronic, debilitating anxiety disorder associated with significant disability and functional impairment and a host of comorbid physical and mental health conditions.¹⁻⁴ PTSD is characterized by a prolonged psychophysiological response to 1 or more traumatic events and manifests in 3 clusters of symptoms, including reexperiencing (e.g., intrusive thoughts and memories, nightmares, flashbacks), avoidance (e.g., avoiding thoughts, feelings, people, places associated with the trauma, emotional numbing) and hyperarousal (e.g., hypervigilance, exaggerated startle response, difficulty sleeping).¹ PTSD often co-occurs with major depression, anger and impulsive aggression, chronic pain, insomnia, addiction, and suicide.⁵⁻⁹

War veterans comprise a large percentage of the population with PTSD. The prevalence of PTSD among returning Afghanistan War and Iraq War veterans in the United States is increasing,³ with estimates as high as 20%¹⁰ and even higher rates reported among those seeking services from the Department of Veterans Affairs (VA).⁶ Although several empirically supported interventions are known to be successful for reducing symptoms of PTSD, a substantial number of veterans fail to complete these treatment programs and others complete treatment without experiencing significant relief from symptoms.¹¹⁻¹² Furthermore, the efficacy of many of these treatments for veterans with multiple comorbid mental health diagnoses and prolonged, complex trauma histories has not been established.

Yoga as a Treatment for PTSD

Yoga may provide an effective integrative treatment option for veterans with PTSD.¹³ Yoga practices may directly address symptoms of PTSD and may provide coping skills to decrease their negative impact on quality of life. The present-focused breathing and concentration used in many yoga traditions may reduce worry and anxiety and decrease fears involving people and events out of an individual's control. The cultivation of acceptance and nonjudgment may directly address avoidance behaviors,¹⁴ and modulation of the breath may directly ameliorate hyperarousal. In addition, yoga asana may help release trauma that has been physically instantiated in the body, which may facilitate behavioral activation through regulation of interoceptive and sensorimotor neural pathways.¹⁵⁻¹⁷

A number of studies have demonstrated the beneficial effects of yoga practices on the regulation of the autonomic nervous system.¹⁸ Several randomized controlled trials (RCTs) have provided preliminary support for the use of

yoga in the treatment of depressive and anxiety disorders in civilian populations¹⁹⁻²⁰ and for the treatment of chronic pain in veterans.²¹ No RCTs have examined the efficacy of yoga therapy for war veterans with PTSD, however. To date, published studies include pilot reports with small samples, ill-defined treatment protocols, and insufficient assessment at follow-up.^{15, 22-23} Research on the efficacy of mindfulness and other types of meditation for the treatment of PTSD is hampered by similar limitations.

Mindfulness and Meditation Practices as a Treatment for PTSD

Several investigations have revealed a significant inverse relationship between mindfulness and PTSD symptoms.²⁴⁻²⁶ No RCTs have explicitly examined the use of mindfulness as a treatment for PTSD. Two studies of Transcendental Meditation,²⁷⁻²⁸ 2 examining mantra repetition,²⁹⁻³⁰ and 1 assessing iRest Yoga Nidra³¹ suggest that these practices offer a promising intervention for PTSD.³² Longitudinal RCTs with large samples are needed to build an evidence base supporting yoga, meditation, and mindfulness practices as valid and reliable treatments for PTSD.³³⁻³⁵

Use of Yoga Therapy to Treat PTSD

Those in the field of yoga therapy are working to delineate its role in healthcare service delivery.³⁶⁻³⁸ The role of yoga therapy in mental health treatment has received increased attention, and a wide variety of opinions and perspectives from members of the yoga community have been presented. The International Association of Yoga Therapists (IAYT) recently published guidelines for the training of yoga therapists. Although comprehensive, these guidelines may not adequately address training needs for those offering yoga therapy as part of mental health treatment. This is particularly crucial when working with individuals with chronic or severe psychological illness, including PTSD.³⁹ To understand how yoga therapy may be most effectively integrated into mental health systems in the future, it is important to understand how it is used.

The VA Healthcare System provides an ideal platform for a comprehensive analysis of yoga and the use of yoga therapy for PTSD. Understanding how yoga is being used as part of PTSD treatment in the nation's largest healthcare system may provide an important first step in optimizing its integration into traditional mental health models. This report describes the prevalence, nature, and context of the use of yoga, mindfulness, and meditation other than mindfulness in VA specialized PTSD treatment programs.

The VA system has increased its mental health budget and workforce considerably in recent years to reduce the prevalence of PTSD among U.S. veterans.⁴⁰ Training and dissemination of evidence-based interventions for PTSD are a top priority, and multiple forms of cognitive and behavioral psychotherapy have been widely implemented.⁴¹ Complementary and alternative medicine (CAM) is widely offered at the VA.⁴²⁻⁴³ To date, no research or administrative data have documented the prevalence of CAM usage for treatment of PTSD at the VA.

An exploratory survey was designed and implemented to investigate the prevalence of the use of 32 types of CAM in VA specialized PTSD treatment programs. Results of the full survey are available elsewhere.⁴⁴ This report presents data from a subset of 30 questions used specifically to examine (a) how yoga, mindfulness, and meditation other than mindfulness instruction is offered, including programmatic logistics and mechanisms; (b) the credentials of those who provide this instruction to veterans with PTSD participating in specialized PTSD treatment programs; and (c) the types of yoga, mindfulness, and meditation instruction provided.

Methods

Data for this study were derived from a subset of 30 questions from the original survey⁴⁴ that was designed based on interviews with program coordinators from 8 VA specialized PTSD treatment programs that offer CAM treatments. The full survey consisted of 81 mixed-format questions that included a skip pattern to decrease respondent burden. It was estimated to require less than 30 minutes to complete. The survey assessed the use of 32 types of CAM within the past year and the context and nature of 6 CAM treatments (yoga, mindfulness, and meditation other than mindfulness, tai chi, qi gong, and massage and bodywork) that were identified by the coordinators as highly prevalent. Thirty questions are used to assess the prevalence, context, and nature of yoga, mindfulness, and meditation other than mindfulness within the specialized PTSD treatment programs.

Mindfulness and meditation are often, but not always, considered to be a part of yoga. There are practical and theoretical limitations in differentiating yoga, mindfulness, and meditation.¹³ Given that there is no single agreed-upon definition of these practices, we designed our survey to assess these practices as mutually exclusive categories. Consequently, the survey questions and results refer to yoga, mindfulness, and meditation other than mindfulness as distinct constructs.

Study procedures were approved by the Human Subject Subcommittee of the VA Connecticut Healthcare System, West Haven. Surveys were mailed to program coordinators

from each of the 170 specialized PTSD programs in the VA Healthcare System between September 2010 and March 2011. Although PTSD treatment is offered in VA mental health facilities outside of these specialized programs, the designation of “specialized PTSD program” is used for the 170 programs that are staffed by experts who have concentrated their clinical work in the area of PTSD treatment and meet specific staffing and reporting requirements as determined by the Northeast Program Evaluation Center (NEPEC).¹ Each program coordinator identified in the NEPEC directory was asked to complete, or have a designated staff member complete, the survey and return it in a provided postage-paid envelope. Two follow-up emails were sent to the identified coordinators of each of the programs who had not returned the survey. In the event of continued nonresponse, we attempted to contact program coordinators by telephone.

Data were entered into SAS version 9.2 for descriptive analyses. Of the 170 surveys sent, 125 were completed, representing a 73.5% response rate. Twenty of 125 completed surveys were administered via the telephone; each of the survey questions were read verbatim and responses were recorded. The specialized PTSD programs include outpatient, inpatient, and residential programs.⁴²

Results

Table 1 illustrates the use of yoga, mindfulness, and meditation other than mindfulness by program type (inpatient, outpatient, and residential).

Table 1. Survey Response by Type of Treatment Program

Type of Treatment Program	Programs Offering Yoga <i>n</i> (%)	Programs Offering Mindfulness <i>n</i> (%)	Programs Offering Meditation (other) <i>n</i> (%)
Inpatient programs (<i>n</i> = 8)	5 (62.5)	7 (87.5)	3 (37.5)
Outpatient programs (<i>n</i> = 98)	26 (26.5)	75 (76.5)	27 (27.6)
Residential programs (<i>n</i> = 19)	5 (26.3)	14 (73.7)	2 (10.5)
All programs (<i>n</i> = 125)	36 (28.8)	96 (76.8)	32 (25.6)

When a respondent indicated that one or more of these services was not offered, he or she was asked to identify barriers to their implementation (Table 2). “Lack of trained staff” and “lack of funding” were most often endorsed as barriers to the provision of yoga, mindfulness, and meditation instruction. “Lack of veteran interest” was infrequently cited as justification.

Table 2. Barriers to Providing Yoga, Mindfulness, and Meditation Other Than Mindfulness Instruction For Sites That Do Not Offer These Services*

Barriers to the Provision of Care	Yoga (n = 86) n (%)	Mindfulness (n = 28) n (%)	Meditation (n = 80) n (%)
Lack of research supporting efficacy	23 (26.7)	7 (25.0)	15 (18.8)
Lack of leadership support	22 (25.6)	3 (10.7)	11 (13.8)
Lack of funding	46 (53.5)	9 (32.1)	22 (27.5)
Lack of space	40 (46.5)	3 (10.7)	19 (23.8)
Lack of trained staff	73 (84.9)	19 (67.9)	49 (61.3)
Lack of veteran interest	12 (14.0)	4 (14.3)	8 (10.0)
None	3 (3.5)	3 (10.7)	17 (21.3)

Note. *Participants could select multiple responses.

Yoga

Table 3 lists the characteristics of instructors from the 36 programs offering yoga. Yoga was not defined for the respondents. Not all programs provided responses to every question. Yoga instruction was most frequently offered by program staff (42.9%), followed by other VA staff members (28.6%) or providers from the community (28.6%).

Table 3. Characteristics of Yoga Instructors (n = 36 Programs)*

Yoga Instructors	n (%)
Staff within the program	15 (42.9)
VA staff from outside the program	10 (28.6)
Other programs/clinics at this VA	6 (17.1)
Private providers and volunteering professionals come to program	10 (28.6)
Yoga not provided but recommended through referrals to other agencies/providers	1 (2.9)

Note. *Participants could select multiple staffing sources.

Table 4 illustrates the Yoga Alliance registration held by the primary yoga instructor. (Although the question presented on the survey asked about yoga “certification” held by the primary yoga therapist, the yoga industry standard is registration with Yoga Alliance.) Fifty-eight percent of respondents indicated that their program’s yoga instructor was registered at the 200-hour (RYT-200) or the 500-hour (RYT-500) level. These data are incomplete, however, because 30% of survey responders indicated they “don’t know.”

Respondents were asked whether their yoga instructors had special training to work with individuals with PTSD (Table 5). Most respondents were unable to answer this question. Of those trained, Trauma-Sensitive Yoga, Mindful Yoga Therapy for veterans with PTSD, Yoga Warriors

Sensory Enhanced Yoga, and iREST Integrative Restoration were most frequently endorsed.

The healthcare credentials of primary yoga instructors are shown in Table 6. Instructors represented a wide variety of professions, with social workers being the most frequently represented.

Table 4. Primary Yoga Teacher Yoga Alliance Registration (n = 35 Programs)

Certification	n (%)
Registered Yoga Teacher-200 hour (RYT-200)	13 (39.4)
Registered Yoga Teacher-500 hour (RYT-500)	6 (18.2)
None	6 (18.2)
Don’t know/not sure	10 (30.3)

Table 5. Specialty Yoga Training Certifications Held by Primary Yoga Instructor (n = 28 Programs)*

Specialty Yoga Training	n (%)
Trauma-Sensitive Yoga (Trauma Center, Brookline, MA)	2 (8.3)
Mindful Yoga Therapy (Veterans Yoga Project, Newington, CT)‡	3 (12.5)
Yoga Warriors Protocol (Central Mass Yoga, West Boylston, MA)	4 (16.7)
iREST	3 (12.5)
Don’t know/not sure	14 (58.3)
Other+	2 (8.3)

Note. *Participants could select multiple responses; +Other responses included “yoga therapist in LHYP tradition” and “IYT through Holy Cow Yoga.”

Table 6. Yoga Instructor Healthcare Credentials (n = 34 Programs)

Credentials	n (%)
Psychiatrist	1 (3.1)
Clinical psychologist	2 (6.3)
Master’s-level psychologist or counselor	2 (6.3)
Master’s-level social worker	7 (21.9)
Nurse practitioner	2 (6.3)
Expressive/creative arts therapist	1 (3.1)
Recreation therapist	3 (9.4)
No formal credentials	7 (21.9)
Other+	9 (28.1)

Note. +“Other” responses included occupational therapist, physical therapist, physical therapy assistant, MS family services, unknown, nephrologist MD, MS/OTR, and psychology trainee.

The survey assessed the types of yoga practices offered (Table 7). Pranayama (breathing) instruction is most frequently provided, followed by asana (physical postures) and meditation. Respondents indicated that there is considerable variability in the types of yoga offered (Table 8).

Table 7. Yoga Practices Used (n = 36 Programs)*

Practice	M (SD)
Meditation	7.16 (2.84)
Pranayama (breathing techniques)	8.24 (1.98)
Asana (physical postures)	7.29 (2.65)
Philosophy (yamas and niyamas)	2.63 (2.81)
Other+	3.14 (4.02)

Note. *Responses are scored on a Likert scale (range 0–10 in which 0 = *not at all* and 10 = *very heavily emphasized*); +“Other” responses included Yoga Nidra, affirmations, guided relaxation.

Table 8. School or Tradition of Yoga Instruction (n = 36 Programs)*

School/Tradition	n (%)
Iyengar	2 (5.9)
Ashtanga	2 (5.9)
Viniyoga	1 (2.9)
Bikram	0 (0.0)
Sivananda	0 (0.0)
Integral	1 (2.9)
Kundalini	2 (5.9)
Kripalu	1 (2.9)
Trauma-Sensitive Yoga	0 (0.0)
Yoga Warriors Protocol	2 (5.9)
Mindful Yoga Therapy	3 (8.8)
Chair yoga	3 (8.8)
Yoga Nidra	5 (14.7)
Integrative Restoration (iREST)	3 (8.8)
Don't know/not sure	11 (32.4)
Other+	10 (29.4)

Note. *Participants could select multiple responses; + “Other” responses included Hatha, LHYF, Mindful Yoga + breathwork, Anusara, part of MBSR protocol, most basic beginning stuff, very basic idk, yoga Namaste, and multiple disciplines.

Table 9. Frequency, Duration, and Format of Yoga Instruction

Frequency	n(%) (n = 33 programs)
Daily	0 (0.0)
Twice per week	5 (15.2)
Once per week	20 (60.6)
Once every other week	4 (12.1)
Other	4 (12.1)
Duration	n (%) (n = 31 programs)
15 minutes	1 (3.2)
30 minutes	2 (6.5)
45 minutes	3 (9.7)
60 minutes	18 (58.1)
75 minutes	4 (12.9)
Other	3 (9.7)
Format	n (%) (n = 32 programs)
Always in group format	28 (87.5)
Always in individual format	0 (0.0)
Both in individual and group formats	4 (12.5)

Table 9 presents data regarding the logistics of the yoga sessions. The majority of programs offer yoga instruction in a group format, 1 time per week for 60 minutes. The major-

ity of yoga groups (62.5%) are offered specifically for veterans with PTSD, with some provided for veterans with a variety of psychiatric diagnoses and for those with or without any psychiatric illness (Table 10).

Table 10. Diagnostic Status of Veterans Receiving Yoga Instruction (n = 32 Programs)

Participants	n (%)
Veterans with PTSD	20 (62.5)
Veterans with various psychiatric diagnoses	40 (12.5)
Veterans with and without psychiatric diagnoses	8 (25)

Mindfulness and Meditation

Because of a lack of clear distinction among meditation styles, the survey treated mindfulness separately from meditation other than mindfulness. Ninety-five programs reported offering mindfulness instruction and 30 taught meditation other than mindfulness.

Most (76.8%) programs endorsed offering mindfulness training (Table 11). Mindfulness was taught either as a stand-alone practice or in the context of therapeutic treatments that included Dialectical Behavior Therapy (DBT), Acceptance and Commitment Therapy (ACT), Mindfulness-Based Stress Reduction (MBSR), and Mindfulness-Based Cognitive Therapy (MBCT).

Table 11. Context in Which Mindfulness is Offered (n = 95 Programs)*

Format	n (%)
As part of Dialectical Behavior Therapy	33 (34.4)
As part of Acceptance and Commitment Therapy	41 (42.7)
Via the Mindfulness-Based Stress Reduction protocol	19 (19.8)
Via the Mindfulness-Based Cognitive Therapy protocol	11 (11.5)
As a stand-alone practice	35 (36.5)
Integrated into another treatment modality	28 (29.2)

Note. Participants could select multiple responses.

Table 12. Type of Meditation Instruction Offered (n = 30 Programs)*

Meditation	n (%)
Transcendental meditation	8 (26.7)
Vipassana meditation	6 (20.0)
Meditation as part of another treatment modality	14 (46.7)
Other	7 (23.3)

Note. *Participants could select multiple responses; *Other responses included thought stopping, breathing and counting, visualization, diaphragmatic breathing relaxation, mantra repetition (n = 2), and labyrinth.

Of the 30 programs that reported offering meditation other than mindfulness, meditation was “part of another treatment modality” (Table 12). Mindfulness and meditation

other than mindfulness were most often offered 1 time per week and in 60-minute sessions (see Table 13).

Table 13. Frequency and Duration of Mindfulness and Meditation Other Than Mindfulness Instruction

Frequency	Mindfulness (n = 91)	Meditation (n = 30)
Daily	11 (12.1)	2(6.7)
Twice per week	14 (15.4)	6 (20.0)
Once per week	42 (46.2)	12 (40.0)
Once every other week	6 (6.6)	3 (10.0)
Other	18 (19.8)	7 (23.3)
Duration (n = 90)		(n = 30)
15 minutes	13 (14.4)	2 (6.7)
30 minutes	8 (8.9)	4 (13.3)
45 minutes	9 (10.0)	1 (3.3)
60 minutes	38 (42.2)	20 (66.7)
75 minutes	5 (5.6)	1 (3.3)
Other	17 (18.9)	2 (6.7)

Table 14. Characteristics of Mindfulness and Meditation Instruction*

Instruction	Mindfulness (n = 95)	Meditation (n = 32)
Provided directly by staff at this program	81 (85.3)	25 (80.7)
Provided by VA staff outside this program	21 (22.1)	4 (12.9)
Provided by other programs/clinics at this VA	17 (17.9)	1 (3.2)
Provided in this program via links with other agencies (e.g., private providers, volunteering professionals)	0 (0.0)	1 (3.2)
Not provided, but recommended through referrals to other agencies or providers	0 (0.0)	0 (0.0)
Other	0 (0.0)	0 (0.0)

Note. Participants could select multiple responses.

Table 15. Healthcare Credentials of Mindfulness and Meditation Instructors*

Credentials of Provider	Mindfulness (n = 96)	Meditation (n = 31)
Psychiatrist	4 (4.1)	4 (12.9)
Clinical psychologist	70 (72.9)	17 (54.8)
Master's-level psychologist or counselor	8 (8.3)	2 (6.5)
Master's-level social worker	40 (41.7)	11 (35.5)
Nurse practitioner	7 (7.3)	3 (9.7)
Expressive/creative arts therapist	1 (1.0)	1 (3.2)
Recreation therapist	0 (0.0)	0 (0.0)
No formal credentials	4 (4.2)	0 (0.0)
Other	6 (6.3) +	5 (16.1)++

Note. *Participants could select multiple responses; +“Other” responses for mindfulness included C-SAC, occupational therapist (n = 2), rehab tech, rehab counselor, LCDC; ++“Other” responses for meditation other than mindfulness included occupational therapist, chaplain, rehab tech, health tech, clin. spec. nurse.

The survey included questions assessing by whom mindfulness and meditation other than mindfulness training was offered (Table 14). Education was most often provided by VA staff, most of whom were clinical psychologists and master’s-level social workers (Table 15).

The majority of mindfulness and meditation instruction did not include yoga or other mindful movement exercises (Table 16).

Table 16. Inclusion of Meditative Movement

Format	Mindfulness (n = 86)	Meditation (n = 29)
Mindfulness/meditation instruction includes yoga or other meditative movement exercises	17 (19.8)	9 (31.0)
Mindfulness/meditation instruction does not include yoga or other meditative movement exercises	69 (80.2)	20 (69.0)

Discussion

PTSD is a chronic, debilitating anxiety disorder marked by symptoms of reexperiencing, avoidance, and hyperarousal. It is associated with significant disability and impairment. A growing number of studies suggest that yoga practices may help alleviate many of the psychological, physiological, and behavioral symptoms of PTSD. Yoga is a patient-centered practice that has been implemented in 28.8% of VA specialized PTSD treatment programs. Mindfulness and meditation are also widely used.⁴⁴

Barriers to Implementing Yoga, Mindfulness, and Meditation Programs

In addition to facilitating understanding of the nature and context of yoga provided in VA specialized PTSD treatment programs, the survey was designed to examine barriers to providing yoga in these programs. The most commonly cited obstacle was “lack of trained staff” and “lack of funding.” This suggests that program coordinators may be willing to incorporate yoga into their programs if they are provided necessary resources.

Consistent with previous reports demonstrating veterans’ interest in CAM treatments,⁴⁶⁻⁴⁷ “lack of veteran interest” was not commonly endorsed as a barrier to providing yoga, mindfulness, or meditation instruction. Yoga and other mind-body practices may be of interest to veterans with PTSD. “Lack of research supporting efficacy” was cited as a barrier by 18%–27% of programs. Empirically rigorous studies examining the efficacy of these practices are needed. Further, mental health clinicians and program coordinators must be educated regarding the growing body of research supporting the use of these practices as an adjunct to conventional PTSD treatment.

Nature of Treatment

A number of survey questions were used to assess the nature of the practices offered. There was great variability in the “schools or traditions” of the yoga represented. RCTs using standardized yoga therapy protocols in VA PTSD programs are needed to identify which aspects of yoga are most beneficial, for whom, and under what conditions. The identification of mechanisms of action will allow researchers, mental health practitioners, and yoga therapists to design and test interventions more specifically targeted to the needs of veterans with PTSD and other related biopsychosocial health problems.

Mindfulness instruction was offered by more than 75% of VA specialized PTSD treatment programs. This was largely due to the presence of mindfulness practices in several conventional psychotherapy treatments, such as MBSR and MBCT. Of the programs that offered mindfulness training, one-third delivered it as a stand-alone practice, separate from these treatments. Of those providing mindfulness and meditation training, 19.8% and 31%, respectively, indicated that yoga or other meditative movement exercises were included. Given research and theory about the instantiation of trauma in the physical body,^{15-17, 48-49} more information is needed regarding which forms of asana practice might be therapeutically effective for releasing physical traumatic imprints.

Frequency and Duration of Yoga, Mindfulness, and Meditation Other Than Mindfulness Instruction

Yoga, mindfulness, and meditation other than mindfulness instruction was typically offered 1 time per week for 60 minutes each. Recent evidence suggests that yoga practices are most effective when practiced regularly. In fact, many yoga and meditation traditions encourage daily practice. Although the survey did not assess the frequency of yoga practice among the veterans participating in the treatment programs, future studies should explore the psychological benefits of increased frequency of yoga classes and emphasis on the development of a regular home practice to supplement the structured group classes. Future investigations might also examine the added benefit of individual yoga sessions for veterans with PTSD.

Characteristics of Yoga Instructors

Although mindfulness and meditation other than mindfulness training were most often provided by VA staff, more than 28% of respondents indicated that yoga educa-

tion was provided by private instructors and volunteering professionals (as opposed to VA staff). Consistent with results regarding barriers to treatment, this suggests that a limited number of VA mental health staff are trained to teach yoga.

Many mental health professionals receive some training in the fundamentals of mindfulness meditation and breathing retraining; however, few are trained in yoga-based breathing exercises (pranayama) or other aspects of yoga therapy. There may be an important role for qualified yoga therapists in PTSD treatment programs. Our data suggest that there are many volunteer yoga therapists in specialized PTSD programs. Additional investigation of the impact of “seva” yoga by volunteering professionals and yoga service organizations (see Reference 50) is warranted.

Yoga Teacher Credentials

The survey investigated the mental health credentials of educators teaching yoga, mindfulness, and meditation other than mindfulness, as well as the yoga registration status and specialty yoga training of primary instructors. The majority of respondents were unaware of the credentials of their yoga instructors. This was likely a consequence of the nature of survey implementation, in that surveys could be completed by program coordinators or designated staff. A need exists for greater education of mental health clinicians and program coordinators regarding the training and credentialing of yoga therapists.

Healthcare credentials. Mindfulness and meditation other than mindfulness instruction was most often provided by mental health professionals. There was more variability in the healthcare credentials of yoga instructors, who included medical doctors, mental health professionals, physical and occupational therapists, and creative arts and recreational therapists. The fact that such a diverse group of healthcare providers was represented speaks to the multidisciplinary, integrative nature of yoga as a treatment modality.

Yoga training. A majority of yoga instructors were registered with Yoga Alliance. Eighteen percent of respondents indicated that the yoga primary instructor was not registered. Although most respondents reported that they did not know if the yoga therapist had specialty training to provide yoga instruction to individuals with trauma and/or PTSD, many instructors were reported to have some training in this area. Ongoing discussion regarding requisite training and qualifications for yoga instructors and therapists working with individuals with serious mental illness, including PTSD, is clearly needed.³⁹

Although potentially beneficial, yoga as a treatment for serious mental illness may have inherent risks. A well-intentioned but insufficiently trained yoga therapist might inad-

requently trigger hyperarousal and reexperiencing symptoms by violating a student's personal space while attempting a physical assist in an asana practice. Similarly, although meditation may benefit some individuals with PTSD,^{27,29} it may be intolerable for others. A number of authors caution that mindfulness may be contraindicated for patients lacking appropriate emotion-regulation skills or clinical support.⁵¹⁻⁵² Necessary training and skill level required for adequate conceptualization of the risks and benefits of yoga therapy for persons with PTSD are an important area for future inquiry.

In the absence of such information, it is important for yoga teachers and therapists to understand the limits of their scope of practice and to collaborate with qualified mental healthcare professionals. Similarly, there are no standards among mental health professionals regarding the extent of training and experience needed to provide yoga therapy or meditation instruction to individuals with serious mental illness. It is essential that we build bridges and professional partnerships between mental health providers and yoga therapists to ensure an exceptional standard of care.

Limitations

There are several important limitations to this study. First, 125 of 170 programs completed the survey. The prevalence of yoga usage reported here may have been influenced by a response bias, in that programs that submitted a completed survey may systematically differ from those that did not. Programs not offering CAM treatments may have been less likely to respond, resulting in an overestimate of prevalence. Second, although the survey was sent to program coordinators, they may have been completed by a designated staff member, potentially resulting in differential response patterns, depending upon who completed the items. Limiting the survey to program coordinators may have resulted in increased confidence regarding the veracity of responses but may also have led to a lower response rate.

Third, we did not assess the number of veterans with PTSD who are receiving yoga instruction either within or outside the VA system. Finally, respondents were not provided with definitions of yoga, mindfulness, or meditation other than mindfulness. Because a particular yoga-based practice may fall under more than one of these headings, respondents may have endorsed more than one type of instruction when only one was offered (e.g., Yoga Nidra). Practices should be formally operationalized in subsequent investigations.

Conclusions

This is the first study to describe the prevalence, context, and nature of yoga, mindfulness, and meditation other

than mindfulness instruction offered to veterans with PTSD in VA specialized PTSD treatment programs across the United States. Yoga, mindfulness, and meditation instruction are widely available, and there is considerable variability in the nature and the context in which instruction is offered. More and better education of mental health clinicians and administrators is needed in terms of training and skills of yoga therapists. Limited funding and lack of trained staff were the most frequently cited barriers to offering yoga, which may create an opportunity for properly trained yoga therapists to volunteer their services to veterans needing treatment. There is a pressing need for scientific research examining the efficacy of yoga practices for veterans with PTSD. Positive findings from empirically rigorous studies of the effectiveness of yoga therapy may stimulate funding for yoga therapists to be included on interdisciplinary teams providing treatment to veterans with PTSD and other mental health disorders.

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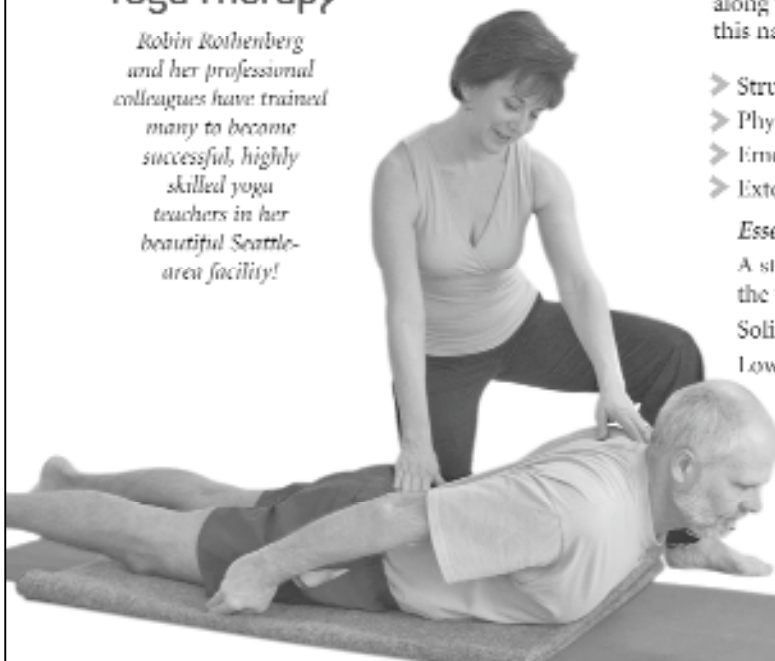
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Perspective

Bridging Yoga Therapy and Personal Practice: The Power of Sadhana

Ananda Balayogi Bhavanani, MBBS, ADY

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Yoga chikitsa (yoga as a holistic therapy) is becoming extremely popular, and numerous studies worldwide are providing scientific evidence of its therapeutic potential.¹⁻⁵ In our zest to make yoga popular, we may be missing the experiential link in the chain. The interconnectivity between research findings, their therapeutic applications, and the yoga therapist's practice must be strengthened to maintain the integrity of the practice of yoga. The strength of any chain is defined by its weakest link. Similarly, the healing potential of yoga chikitsa depends on the personal *sadhana* (practice) and conscious living of the therapist. We are the conduits, and we are responsible for transmitting the spirit of yoga to our patients or clients.

In our developmental process we initially gain data, collecting pieces of information and forming cognitive maps and schemas. As this information is consolidated, it becomes knowledge. When this understanding is assimilated with life experience, this knowledge becomes wisdom, or *jnana*. The commitment to and deepening of our *sadhana* enables us to experience an expansion from our finite, limited, ego-bonded consciousness into an infinite, limitless, universal consciousness. At this point we attain the state of *prajna loka*, a dimension where we are one with the wisdom of the Universe itself.

Spirituality and science were not separated in ancient cultures. It is only in modern times that they have been artificially divided. As Albert Einstein stated, "Science without religion is lame, religion without science is blind."⁶ Further, "All religions, arts and sciences are branches of the same tree."⁷ Yoga is both an art and a science. As one who loves both its dimensions, I am heartened by Einstein's con-

attention that "everyone who is seriously involved in the pursuit of science becomes convinced that a spirit is manifest in the laws of the universe—a spirit vastly superior to that of man, and one in the face of which we with our modest powers must feel humble."⁸ Truly, science and spirituality are indivisible at both the cosmic and the individual level.

In many ways modern yoga has lost touch with its holistic nature. Therapists may prescribe yoga techniques for different conditions as if *asana*, *pranayama*, *mudra*, *bandha*, and the like are antidotes for specific conditions. This is yogopathy and not yoga chikitsa, the holistic application of yoga as a therapy.⁹ In the absence of personal *sadhana*, or direct experience, how can a yoga therapist knowledgeably recommend practices to others?

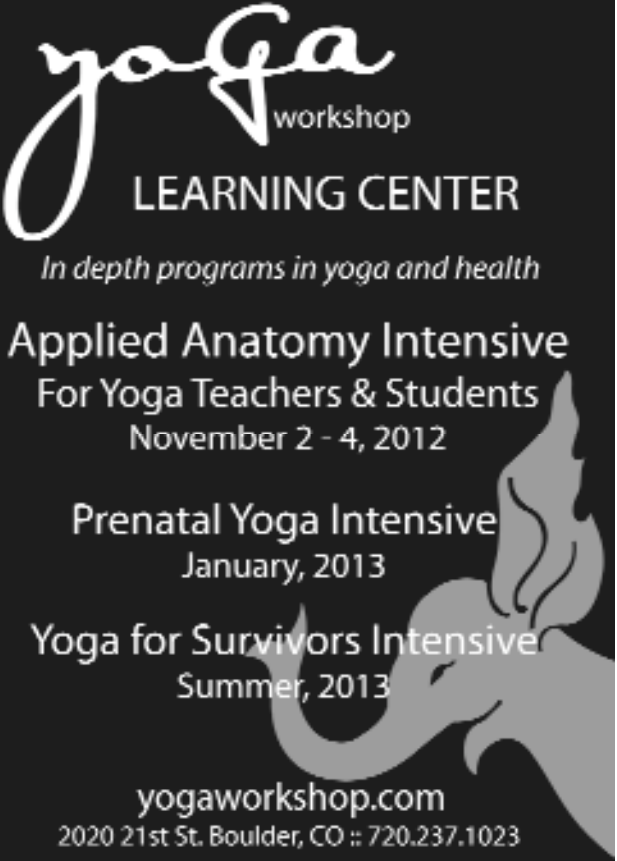
The same holds true for researchers studying the effects of yoga techniques. When individuals lack personal experience with the practices, how can they comprehend what they are studying? Without this experience, one cannot truly understand what to measure or how to examine the richly interwoven tapestry of a participant's experience. One could argue that a physician does not need to experience an illness or a treatment to be effective. But yoga differs from modern medicine in that its central philosophy is predicated on the wisdom that comes from personal experience with the practices (*jnana*), not only the knowledge of them.

As yoga practitioners, teachers, researchers, and therapists we bear the responsibility to live the philosophies and practices of yoga through *sadhana*. In bridging *sadhana* and yoga therapy, we unlock the potential for transformation for our clients and communities as well as for ourselves.

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Yoga Therapy in Practice

Perspective

Building Bridges for Yoga Therapy Research: The Aetna, Inc., Mind–Body Pilot Study on Chronic and High Stress

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Background

In 2009, Aetna, Inc., invited Gary Kraftsow and the American Viniyoga Institute (AVI) to contribute to a research study on modulating stress. This partnership represented the first formal recognition of the potential role of yoga therapy in modern healthcare by an insurance company.

This project exemplified the power and value of a collaboration in which yoga therapists made the ancient yoga teachings relevant to healthcare research. We must understand our own ancient traditions, learn the language of Western medicine, and recognize opportunities to build bridges to medical disciplines, academic partners, insurers, funders, and policy makers. By sharing our experience, we hope to provide an example through which others may benefit and seek ways to continue advancing evidence-based yoga research.

Bridging Ancient Traditions and Modern Research

On a trip to Madras, India, in 1980, Gary's teacher, T.K.V. Desikachar, advised him to study Western medical

science. As a student of religious studies and Sanskrit, Gary was surprised that Desikachar guided him in that direction. Desikachar envisioned Gary's critical role in bringing yoga and yoga therapy into Western healthcare in the future. As a result, Gary embarked on an independent study of anatomy, physiology, psychology, and basic principles of Western medical science and healthcare systems to begin building the necessary bridges. The prediction was prophetic.

Twenty years later, through AVI graduate Robin Rothenberg, Dr. Karen Sherman of the University of Washington invited Gary to develop a yoga therapy intervention for a study of chronic low back pain. The investigation, funded by the National Institutes of Health (NIH), was subsequently reported in the *Annals of Internal Medicine*. Opportunities opened for collaborations with other researchers, with Gary designing Viniyoga interventions for generalized anxiety disorder and other therapeutic applications.

Recognizing an Opportunity

In 2008, Gary met Mark Bertolini, currently the chairman and CEO of Aetna, Inc. Mark had a deep connection to the practice of yoga and clarity about its potential role in the current healthcare crisis. He shared the vision of a shift

from a physician- and pharmaceutical-centric care model to one that is patient centric, empowering individuals to make conscious choices for self-care to prevent and/or manage chronic conditions.

Mark proposed that Gary design a workplace stress management program and empirically test its effectiveness. The goal of this study was to evaluate Viniyoga and the Mindfulness at Work intervention, each of which had the potential to decrease stress and stress-related insurance claims.

Building the Team for a Successful Research Collaboration

For AVI, a relatively small yoga organization, the opportunity to partake in yoga research with Aetna, Inc., and two other partners, e-Mindful and Duke University Integrative Medicine, was exciting and daunting. Two of the greatest challenges of integrating a yoga study with a corporate partner were building consensus among the markedly different cultures of yoga, research, healthcare, and corporate insurance and executing the study. The participating organizations were vastly different in size, scope of work, expertise, resources, operating styles, and stakeholders. Keys to the project's success were a collaborative spirit, open communication, and a strong commitment to these values by the leaders of each organization.

A large project team with broad-based skills in project management, knowledge of corporate cultures, and product marketing was used to bridge the missions and goals of the stakeholders. On a granular level, a subteam was formed to contribute skills in medical knowledge, statistical support, research methodology, and working with human subjects, as well as expertise in the two interventions, Viniyoga and Mindfulness at Work. AVI also assembled an internal research team.

While building this internal team, it was essential for AVI to build bridges with AVI-trained faculty, alumni, and friends who had specialized expertise. Gary's expertise included intervention design, enthusiasm for contributing to healthcare solutions, mentoring of teachers, and an ability to inspire graduates to become involved. Several AVI graduates contributed expertise in the form of designing training and evaluation materials, collecting qualitative and quantitative data, communicating findings, and planning for product marketing.

Learning Western Medical Research Methodology

A number of key principles apply when designing and conducting empirically rigorous research. Studies must be clearly focused, well designed, and systematically executed. The first and most important challenge in launching this investigation was to create a focus for the project and to build team consensus regarding measurable outcomes. Once the large team agreed about the main project goals, the internal research team had to agree on which parameters to assess, duration of the intervention, and the appropriate study population.

Another key to the study's success was the development of guidelines and procedures to ensure careful and systematic project delivery. This included developing a treatment manual for which Gary wrote the Viniyoga sequences with a specific intention and progression for the study period of 12 weeks. Weekly team teleconferences ensured that the yoga intervention was delivered according to the established criteria.

Insights for the Future

Collaborative research with health insurers is relatively new for the yoga community. With corporate and government support for funding and research, these collaborations will be important for addressing chronic diseases that increase healthcare costs. Yoga therapy schools interested in such research collaborations should consider leveraging expertise within their organizations and building relationships with academic partners, insurers, funders, and policy makers.

The tradition of yoga therapy empowers individuals to take greater responsibility for their health. As yoga therapists and teachers, we are responsible for adapting the teachings of these great traditions to make them relevant and accessible to the practitioner. To build bridges to modern healthcare, we must learn to communicate in the language of Western medicine and use Western research methods without losing the unique insights and integrity of our own traditions. The success of this study is a testament to the vast potential of partnerships and bridge building between the yoga therapy community, academic institutions, modern healthcare, and corporate stakeholders.

Yoga Therapy in Practice

Perspective

Creating a Biopsychosocial Bridge of Care: Linking Yoga Therapy and Medical Rehabilitation

Matthew Taylor, PT, PhD, E-RYT 500

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If you are reading this perspective, chances are that you are curious about the therapeutic potential of yoga and how to build a bridge between your experience and conventional paradigms of rehabilitation. My intention is to facilitate bridge building between yoga practitioners and the rehabilitation community, including physical, occupational, respiratory, and language therapists and speech and language pathologists. Using a question/answer format, this perspective delineates the many facets of yoga therapy as they relate to rehabilitation. Hopefully the insights offered will inspire you to create your own professional bridges and collaborative partnerships.

Q: What is yoga therapy and why are you interested in it?

A: I began to explore the dimensions of yoga therapy in 1996 to quell the nagging feeling that my work was limited by the mechanistic view of healing endemic in the Western medical model. I discovered that the traditions of yoga offer an orderly and comprehensive system of addressing rehabilitation. For thousands of years yogis have embraced the Indian Vedanta doctrine of the sheaths or *koshas*, which extol the need to understand not only the physical regional interdependence important in optimizing health, but the social, emotional, psychological, and spiritual aspects of the human experience as well. Clearly, the ancient healing modalities of yoga provided the original model of biopsychosocialspiritual rehabilitation.

Yoga offers an empowerment-focused strategy for health and wellness. As the first working definition of yoga therapy for IAYT in 2007 states:

“Yoga therapy is the process of empowering individuals to progress toward improved health and well-being through the application of the philosophy and practice of Yoga.”

As such, the yoga philosophy for healing differs from the pathology-based rehabilitation model. The system is robust enough to address pathology but focuses on optimizing health, a paradigm that we in rehabilitation are only beginning to embrace. Yoga’s process-oriented approach rejects the disempowering “expert fixes the broken” model and restores the responsibility and power of healing to the individual. It also creates a natural bridge to postrehabilitative fitness or medical gym activity in that it emphasizes behaviors that embody wellness rather than dependency or “sick-care.” As a form of appreciative inquiry, yoga emphasizes what is working, what can be optimized, and what requires acceptance, versus loss and dysfunction. Yoga accentuates a holistic rather than an individualistic model of care in that the individual functions within the context of relationships, community, and the planet.

Q: How does yoga therapy fit into the Western medicine context?

A: Yoga is a form of complementary and alternative medicine as defined by the National Center for Complementary and Alternative Medicine (NCCAM). It is one of the most frequently used mind–body therapies in Western complementary medicine. Because of its unique ability to facilitate spiritual, physical, and psychological benefits, it is appealing as a cost-effective alternative to conventional treatments.

As yoga therapy grows in popularity, an increasing number of practitioners, including physical and occupa-

tional therapists, MDs, chiropractors, and mental health professionals, are integrating principles of therapeutic yoga into their practice. Forty percent of International Association of Yoga Therapists' (IAYT) 3,000 members are professionals with specializations in one or more fields of Western medicine. Since 2007, IAYT has sponsored annual symposia to unite yoga therapists and healthcare professionals and to cultivate an evidence base to support yoga as an effective therapeutic option in the treatment of musculoskeletal, physiological, and psychological conditions. The collaborative partnerships and dialogues that have ensued have revealed the considerable crossover between yoga and other rehabilitative therapies in that both use movement, proprioception/awareness, breath modification, and education principles. Indeed, many of the technologies of yoga therapy have been in practice in modern rehabilitative medicine for decades.

Q: How can we begin to engage rehabilitation professionals and others in a dialogue regarding the effectiveness of yoga as a therapeutic practice?

A: To cultivate an understanding of the interconnectedness of yoga and rehabilitation in the context of Western medicine, we can draw on modern sound bite technology. Following are my top 10 talking points for engaging medical professionals in a dialogue about the functional utility of yoga technologies in healthcare settings:

1. Yoga is not merely “stretching.”
2. Yoga therapy involves more than adapting yoga-like postures as therapeutic exercises.
3. In addition to physical postures, yoga therapy includes *mudras* (hand movements/postures), *bhavana* (guided imagery and meditation), *jnana* (study), ethical principles, and guides for healthy diet and lifestyle.
4. The only prerequisite for participating in yoga therapy is that the participant be breathing.
5. Yoga therapy cultivates an awareness of how thoughts, beliefs, perceptions, and habitual patterns (*samskaras*) influence physical posture and mobility, breath quality, mood, and vitality.
6. You can't teach yoga therapy if you don't practice yoga.
7. The manner in which you, the provider, shows up matters as much or more as how the patient arrives.
8. Yoga therapy is by its nature playful and fun (*ananda*).
9. Yoga therapy cultivates the expression of creativity and caring that reflects our true nature.
10. Anyone can practice yoga!

Q: What is a vision for yoga therapy in rehabilitation?

A: The interface between yoga therapy and rehabilitation is fertile ground for substantive health reform, each informing and shaping the other. Yoga therapy harnesses the power of the group process to create community and healing and provides affordable access with robust adaptability to diverse cultural settings. It holds the potential for acknowledging and releasing the cognitive patterns and limiting thoughts that attenuate our ability to integrate yoga's philosophies and practices into our inter- and intrapersonal lives, communities, and society. Yoga therapy holds the potential for healing in ways that have yet to be realized. The time has arrived for yoga therapy professionals to individually and collectively realize the future and to transform rehabilitation.

Additional Resources for Bridge Building in Rehabilitation

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Yoga Therapy in Practice

Yoga and Quality-of-Life Improvement in Patients with Breast Cancer: A Literature Review

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Abstract

Objective: Women undergoing treatment for breast cancer often turn to complementary and alternative medicine (CAM), including yoga, for improvement of mood, quality of life (QOL), sleep, and treatment-related side effects. The extant literature was reviewed to examine the clinical effects of yoga practice on QOL for patients with breast cancer. QOL was defined as physical well-being, social functioning, emotional health, and functional adaptation. **Methods:** Seven databases, including PubMed, Ovid MEDLINE, CINAHL, Embase, PsycINFO, Cochrane Library, and Web of Science were used to search for studies of patients with breast cancer that included a yoga intervention and QOL assessment. Attention was paid to assessing study population, outcome variables, the type of yoga intervention used, and methodological strengths and limitations. **Results:** Seventy-one articles were identified that fit the search criteria. Although the literature provided evidence of QOL benefits of yoga for patients with breast cancer, no specific aspect of yoga was identified as being most advantageous. **Conclusion:** Although participation in yoga programs appeared to benefit patients with breast cancer, greater methodological rigor is required to understand the mechanisms that contribute to their effectiveness.

Key Words: Yoga, yoga therapy, breast cancer, social functioning, emotional health, quality of life, mood

Introduction

Women being treated for breast cancer often turn to complementary and alternative medicine (CAM) for improvements in their quality of life.¹⁻⁶ For purposes of this review, quality of life (QOL) was defined as physical well-being, social functioning, emotional health, and functional adaptation. CAM refers to a group of diverse medical and health care systems, practices, and products that are not generally included under the rubric of conventional medicine.⁷ Yoga is a form of complementary medicine intended to balance the mind, body, and spirit. It includes postures (asana), breathing exercises (pranayama), relaxation techniques, meditation, chant and mantra, and a rich philosophy that guides inter-and intrapersonal relationships. The

purpose of this review was to evaluate and summarize the effects of yoga interventions for patients with breast cancer.

Methods

A literature search was conducted to identify studies that examined the benefits of yoga for patients with breast cancer. Articles were included in the review if they assessed QOL in patients with breast cancer and used yoga as the primary intervention. Seven databases, including PubMed, Ovid MEDLINE, CINAHL, Embase, PsycINFO, Cochrane Library, and Web of Science were used. Search terms included “yoga,” “breast cancer,” and “quality of life.” Each of the 71 studies that were identified was reviewed with attention paid to study population, outcome variables,

type of yoga intervention used, and methodological strengths and limitations.

Physical Well-Being

Physical well-being is defined as the absence of symptom and side effect distress. Whereas an individual's QOL is influenced by his or her physical well-being, one's perception of physical symptoms can greatly affect QOL. This section examines the effects of participating in a yoga intervention on patients' symptom and side effect distress.

Symptom distress. *Symptom distress* refers to a patient's ability to cope with his or her physical condition. In a study of the effects of a 6-week yoga intervention on symptom distress, women age 30–70 recently diagnosed with Stage II or Stage III operable breast cancer who were undergoing surgery, radiation, and chemotherapy were randomly assigned to either a yoga therapy or an educational supportive therapy group. Patients were surveyed about symptoms and the severity of their distress related to each symptom at various time points in the treatment course. Rao and colleagues found that patients undergoing treatment for breast cancer who also received yoga therapy reported reduced symptom distress.⁸ Group-by-time and between-subjects effects showed statistically significant ($p < .05$) decreases in symptom distress in those in the yoga group compared with the no-yoga controls at postsurgery, mid-radiation therapy, post-radiation therapy, midchemotherapy, and postchemotherapy.

In a 10-week, noncontrolled study of the use of Iyengar yoga among cancer patients, Duncan et al. examined 24 patients' most bothersome symptoms before and after the intervention and at 16-week follow-up. Assessment included the Measure Your Medical Outcome Profile 2, a patient-centered measure of health status,⁹ the Functional Assessment of Cancer Therapy-General (FACT-G),¹⁰ and Profile of Mood States.¹¹ Symptom distress decreased significantly from baseline to 10 weeks for those participating in the yoga intervention.¹² This study lacked a control or placebo group.

Side effect distress. Side effects of breast cancer treatment include hair and weight loss, pain, fatigue, and nausea, among others, and often cause distress. In a randomized controlled trial involving 62 early-operable patients with breast cancer undergoing chemotherapy, Raghavendra and colleagues identified benefits of yoga compared with supportive therapy for reducing chemotherapy-induced side effects.¹³ Anticipatory nausea and vomiting and postchemotherapy nausea and vomiting were reduced for yoga group participants compared with controls, as were self-reported "treatment-related distressful symptoms" and "distress experienced." Patients in the supportive care group were offered counseling less frequently than those in the

intervention group were offered yoga, suggesting a possible dose–response effect for the yoga therapy group.¹³

Social Function

In the following section we examine yoga's effects on 2 elements of social functioning: spiritual well-being and social support.

Spiritual well-being. Spiritual well-being refers to the role of religion and spirituality in one's life and the extent to which beliefs and practices help an individual cope with illness. Danhauer et al. examined patient QOL in a pilot study in which 44 participants with breast cancer were randomly assigned to either 10 weeks of yoga or a wait-list control. QOL, including spirituality, was measured using the FACIT-Sp survey.¹⁴ Spirituality ratings between groups did not significantly differ at baseline; however, the yoga group evidenced significantly higher spirituality scores at follow-up than did controls.¹⁵

Individuals with cancer who identify as ethnic minorities report an increased need for emotional support in addressing spiritual concerns.¹⁶ In a randomized controlled trial of yoga among a multiethnic sample (42% African American and 31% Hispanic) of 128 patients with breast cancer, Moedel and colleagues found an increase in FACIT-Sp spiritual well-being ratings for those in the yoga group compared with wait-list controls.¹⁷ The specific mechanisms of the yoga intervention related to increased subjective spiritual well-being are unknown.¹⁷

Social support. Social support includes relationships with family, friends, partners, and community members. Patients with breast cancer and survivors of breast cancer have identified social support as a crucial element for coping with illness^{18,19} and for achieving adequate QOL.²⁰ The presence of social support has been associated with promotion of survival in both early and late stages of disease.²¹

Vadiraja examined the effects of a 6-week daily yoga program for 88 patients with Stage II or Stage III breast cancer undergoing adjuvant radiotherapy. The European Organization for the Research and Treatment of Cancer-Quality of Life Questionnaire (EORTC-QLQ)²² was used to evaluate differences in perceived social support between outpatients with breast cancer who were randomly assigned to receive yoga or brief supportive therapy.²³ Those in the yoga intervention participated in 60-minute sessions daily, and the control group received supportive therapy once every 10 days. Those in the yoga group reported improved social support following the intervention relative to controls.²³

Moedel's randomized controlled multiethnic study used the FACT-G10 to assess social well-being. Although participants in the yoga group did not report significant increase or decrease in social well-being during the study

period (2% decrease), the 12-week wait-list control group noted a significant decrease in support (13%).¹⁷ Participating in yoga may provide women with a sense of social connection. Social support may be particularly important for women who are single and socioeconomically disadvantaged.¹⁷

Qualitative feedback provides another lens with which to examine the function of social well-being with respect to coping with breast cancer. Danhauer asked study participants open-ended questions about their experience of participating in yoga classes. Women most frequently cited the shared group experience as their motivation for continuing to participate;²⁴ for example, one woman reported that she “enjoyed being with other people who have experienced the same problems I have.”²⁴ Group yoga sessions may provide a much-needed social network of individuals who also have breast cancer.

Emotional Health

Anxiety, depression, negative mood, and emotional stress are common causes of poor QOL for patients with breast cancer. Treatment and recovery processes can interfere with daily routines, relationships, career, and other aspects of life. Life disruption coupled with worries about treatment and survival can contribute to emotional symptoms. In this section the effects of yoga on anxiety, depression, mood, and perceived stress and coping ability are discussed.

Anxiety and depression. Anxiety is a common problem for patients during the diagnosis and treatment process, as well as during recovery. Many patients experience fear and anxiety about treatment procedures, side effects, and survival.⁸ It is important to alleviate anxiety regarding procedures because anxiety may interfere with treatment adherence.

In a study of women with breast cancer assigned to either a yoga or supportive therapy intervention, Rao measured state trait and anxiety inventory using the State Trait Anxiety Inventory (STAI).²⁵ Significant between-subjects decreases in trait anxiety in the yoga group compared with supportive therapy controls were detected following surgery, radiation therapy, and chemotherapy.⁸ Between-subjects effects for state anxiety were also observed following surgery, mid- and postradiation therapy, and mid- and postchemotherapy.⁸

Banjeree conducted a randomized controlled trial in which 68 patients with breast cancer undergoing radiotherapy were assigned to receive either yoga or supportive therapy. The yoga program consisted of weekly 90-minute classes that included guided meditation, breathing, and yoga postures, as well as audio and video tools to use at home. Patients completed a Hospital Anxiety and Depression Scale (HADS)²⁶ at baseline and after 6 weeks of an integrat-

ed yoga program. A 51.7% decrease in mean anxiety scores in the yoga group compared with a 28% increase for controls was reported during the 6 weeks that the controls received supportive counseling.²⁷ The number of contact hours for the yoga group compared with that of the supportive therapy group differed considerably and was not considered in the analyses.

Anxiety and depression are also known to be associated with hypothalamic-pituitary-adrenal (HPA) axis dysregulation in patients with breast cancer,²⁸ which can alter cortisol levels. Morning salivary cortisol levels positively correlate with anxiety and depression.²⁹ Vadiraja collected salivary cortisol and self-reported anxiety, depression, and stress data from 88 participants before and after 6 weeks of radiotherapy. Marked decreases in anxiety and morning salivary cortisol were detected for those receiving yoga instruction compared with controls. Findings suggest that yoga may have a role in managing psychological stress and modulating circadian patterns of stress hormones in patients with breast cancer.²⁹

In an examination of patients undergoing chemotherapy, Raghavendra tested whether a yoga practice designed to reduce nausea and emesis might also yield reductions in anxiety and depression and increases in QOL. A significant positive correlation was found between reduced postintervention Morrow Assessment of Nausea and Emesis (MANE)³⁰ scores and reduced postintervention depression.¹³ Findings suggest that reducing depression through yoga may be important not only for its own sake, but that involvement in a yoga program might diminish patients' suffering from common chemotherapy-related symptoms, including nausea and vomiting.

Uncertainty about prognosis and treatment, concern about suffering and death, and physical, functional, and social changes can contribute to depression in patients with breast cancer.^{27,31} It is particularly important to address depression with cancer patients because it may influence recurrence or progression of the disease.^{27,32} Yoga has been found to decrease depression in patients with breast cancer. Studies cite physical activity, breathing, meditation, and group support as helpful elements of the practice.

Affective disturbance. Patients with breast cancer often experience mood disturbance. Danhauer used the Positive and Negative Affect Schedule (PANAS)³³ to examine positive and negative affective states for patients receiving 10 weekly restorative yoga classes. Participants reported significant improvements in positive affect compared with wait-list controls.¹⁵ In similar studies, Danhauer reported a significant decrease in negative affect in patients who had completed a 10-week yoga program,²⁴ and Vadiraja reported a significant increase in positive affect and decrease in negative affect for patients with breast cancer after a yoga intervention.²³

Functional Adaptation

Functional adaptation is characterized by satisfactory cognitive functioning, absence of fatigue, and sufficient restful sleep. These dimensions are essential to an individual's QOL. This section reviews yoga's effects on these factors for patients with breast cancer.

Cognitive function. Cognitive function comprises intellectual processes, including perception, thinking, reasoning, and memory. Studies examining the effects of yoga for patients with breast cancer often evaluate cognitive function before and after treatment. In Vadiraja's study of 88 patients with Stage II or Stage III breast cancer randomly assigned to either a yoga practice or a supportive therapy group, yoga group participants showed notable cognitive improvements over 6 weeks of daily yoga during radiotherapy treatment.²³ In a randomized controlled trial of 38 patients participating in either 7 weeks of yoga or supportive therapy control, Culos-Reed found similar trends, with cognitive disorganization and confusion decreasing in participants who participated in a yoga program.³⁴

Fatigue. Women undergoing cancer treatment often note high levels of fatigue that interfere with daily living. Danhauer's two studies cited previously noted that patients with breast cancer who participate in yoga therapy during or after their treatment experienced reduced fatigue between baseline measurements and after several weeks of yoga.^{15,24} In a small, noncontrolled feasibility study of 13 patients, Carson demonstrated that on the day after a yoga practice, women experienced lower levels of fatigue and higher levels of invigoration.³⁵ Exercise is helpful for reducing fatigue in patients with cancer.³⁶ The asana (posture) component of yoga practice may serve an important function in reducing cancer-related fatigue.

Sleep quality. Between 31% and 54% of patients with cancer report difficulties falling or staying asleep.³⁷ Cohen and colleagues randomly assigned 39 patients with lymphoma to a 7-week Tibetan Yoga group. Participants reported significant improvements in sleep compared with wait-list controls.³⁸ The yoga group reported less sleep disturbance, better subjective sleep quality, faster sleep latency, longer sleep duration, and less use of sleep medications than did wait-list controls.³⁸ Although the number of studies on yoga and sleep quality is limited, the potential for QOL enhancement through improved sleep is important to investigate.

Discussion

A number of studies have examined the effects of participating in a yoga program on QOL for patients with breast cancer. Several high-quality randomized controlled

trials have demonstrated more positive results in physical, social, emotional, and functional adaptation for patients with breast cancer who participate in yoga interventions compared with controls.

Patients who practice yoga appear to be better able to cope with symptoms of illness and with side effects of treatment. Studies show that yoga benefits women's emotional functioning during and after breast cancer treatment, including decreases in anxiety and depression and enhanced cognitive functioning. Reduced fatigue and improved sleep quality were also found. Patients cite physical activity, breathing, meditation, and group support as particularly helpful components of yoga. The practice of yoga is therapeutically unique in that it conjointly emphasizes body, mind, and spirit, which may be particularly useful for enhancing patients' social and spiritual well-being. Group yoga classes provide patients with a community and a forum in which to share their experience.

It is clear that yoga has benefits for patients with breast cancer. Nevertheless, the mechanisms of QOL improvement have yet to be conclusively determined. As is common for a great deal of yoga research, studies have been hampered by a number of factors, including small sample sizes, lack of information regarding the intervention, functional inequivalence of the control group, underdeveloped statistical analyses, lack of sample generalizability, high variability of intervention methods, and overall reliance on participant self-report of outcomes. Limited financial resources may have affected the ability of researchers to conduct large, randomized controlled trials with sophisticated, multitrait, multimethod assessment batteries. As such, the quality of this research is compromised by the limited ability to use longitudinal, within- and between-groups analyses, which are needed to better understand the temporal mechanisms of action in these studies. And last, the high degree of variability among yoga programs designed for individuals with breast cancer and lack of precise description of methods have made standardization, comparison, and replication difficult thus far.

Although the studies examined in this review endorse yoga as a beneficial intervention for patients with breast cancer, the unique contribution of the mechanisms by which the various components of yoga (asana, pranayama, meditation, etc.) contribute to increased QOL remain elusive. The complex nature of the constituent practices and philosophies related to yoga make the intervention components and their effects difficult to operationalize. That said, researchers are duly challenged to create studies that capture the rich and diverse nature of the practices while maintaining rigorous scientific standards.

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Yoga Therapy in Practice

Yoga in the Schools:

A Systematic Review of the Literature

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Abstract

Objective: The objective of this research was to examine the evidence for delivering yoga-based interventions in schools. **Methods:** An electronic literature search was conducted to identify peer-reviewed, published studies in which yoga and a meditative component (breathing practices or meditation) were taught to youths in a school setting. Pilot studies, single cohort, quasi-experimental, and randomized clinical trials were considered. Research quality was evaluated and summarized. **Results:** Twelve published studies were identified. Samples for which yoga was implemented as an intervention included youths with autism, intellectual disability, learning disability, and emotional disturbance, as well as typically developing youths. **Conclusion:** Although effects of participating in school-based yoga programs appeared to be beneficial for the most part, methodological limitations, including lack of randomization, small samples, limited detail regarding the intervention, and statistical ambiguities curtailed the ability to provide definitive conclusions or recommendations. Findings speak to the need for greater methodological rigor and an increased understanding of the mechanisms of success for school-based yoga interventions.

Key Words: Yoga, education, schools, autism, intellectual disability, learning disability, emotional disturbance, typically developing children, school-based yoga program

Introduction

Schools provide an ideal setting in which to promote children's health and well-being. Given the decreasing state of health among our nation's youth,¹ schools are increasingly looked upon as venues to inculcate a healthy lifestyle.² Unfortunately, recent budget cuts and resultant limited resources, coupled with curricula that focus on intellectual development, have attenuated school systems' ability to adopt health-focused programs.³ The fact remains that "students must be healthy in order to be educated, and they must be educated in order to remain healthy."^{4(p.v)} There is an increasingly urgent need to develop and test cost-effective, evidence-based wellness programs for youths that can be delivered in school settings.

Yoga has been found to be an effective complementary therapy to promote health and reduce many of the factors

related to physiological diseases and psychological disorders.^{5,6,7} Recent school-based interventions that include yoga suggest a link between yoga practice and positive child and adolescent outcomes.^{8,9,10} Implementing yoga as a preventative and complementary practice in schools is consistent with a salutogenic model of public health.¹¹ Interventions that use a salutogenic model should (a) emphasize personal change (e.g., increase activity levels, control body weight, decrease stress and anxiety); (b) promote community change (e.g., create parks and bike paths, adopt no-smoking policies) to increase people's opportunities to lead healthful lifestyles; (c) include mental health as a key factor in improving people's well-being, with an emphasis on changing attitudes, increasing self-knowledge, becoming responsible, and being empowered; and (d) emphasize programs that are fun rather than competitive or difficult.¹¹ This review of yoga research explores the academic, cognitive,

and psychosocial benefits of using yoga in schools to promote health and wellness.

Yoga in Schools

Extant research suggests that yoga benefits emotional, physical, and psychosocial health and enhances self-concept and concentration.^{5,12} Each of these indicators of well-being is key to successful child and adolescent development, and each is essential for personal health and academic success. The primary goal of traditional school programming may be academic education, yet skills such as coping with stress and tools for maintaining physical and emotional health are invaluable in and outside of the classroom.³ “Education and health are linked; academic performance is related to health status.”^{3(p6)} In the dialectic between physical health and academic accomplishment, health promotion plays a key role in school success.

In addition to the intellectual challenges at school, children also face myriad psychosocial and interpersonal demands that can require highly developed self-regulation skills. Acquisition of these skills may or may not be consistent with a particular child’s developmental trajectory.¹³ In the absence of these regulatory skills and stress management tools, youths struggle to cope with the behavioral expectations placed upon them in an academic environment. Yoga instruction affords the opportunity to develop these skills. The following sections detail a number of studies in which yoga programs were implemented in school settings and include a discussion about their impact on youth developmental outcomes.

Methods

A comprehensive review of the extant research literature regarding the effectiveness of yoga programs delivered in schools was conducted. Articles were identified using a combination of databases, including PsychInfo, PsychARTICLES, Psychology and Behavioral Sciences Collection, Education Research Complete, ERIC, Alt HealthWatch, and Medline with Full Text. Keywords used to identify articles consisted of various combinations of search terms, including yoga, meditation, children, adolescents, schools, and wellness. The bibliographies of relevant articles were also examined.

Inclusion Criteria

Only peer-reviewed, published manuscripts were considered. Research designs included pilot studies, single cohort, quasi-experimental, or randomized designs that were conducted in an educational setting. Only yoga inter-

ventions that incorporated a physical component (asana) in combination with a mind component (breathing exercises, meditation, relaxation) were examined,¹⁴ as were those that included other strategies (mind discourse, games, massage, etc.). Research with typically and atypically developing school-age (ages 5–21) children was assessed. Atypically developing children are those categorized using 13 special education classifications identified by the Individuals with Disabilities Education Act (IDEA).¹⁵

Unlike previous reviews of the effects of yoga for pediatric populations,^{7,10} this review exclusively targeted those studies conducted in educational settings. They included programs that were integrated into the class schedule, were delivered after school, and were conducted at residential schools. English language publications were included irrespective of country of origin.

Examination of Methodological Rigor

Three independent reviewers (including both authors and their area content librarian) screened abstracts of identified articles for eligibility. Once a potential article was found, both authors evaluated it for inclusion. In contrast to other reviews that integrated multiple evaluative criteria (e.g., Cochrane and Sackett),⁷ articles in this study were independently scored by each author using the Sackett’s levels of evidence strategy.¹⁶ This method provided a stratified approach to systematically rating published research ranging from the most rigorous types of investigation (randomized controlled trials) to the least rigorous (expert opinion). Agreement was reached for 11 of the 12 studies that were identified and that met all inclusion criteria. Disagreement was resolved by consensus. Consistent with recommendations of the PRISMA Group^{17,18} and Jahad and colleagues, the protocol displayed in Table 1 was used.

Results

Of the 12 studies determined to be eligible, 4 contained samples of children in 1 of 13 special education categories: autism spectrum disorder (1), intellectual disability (1), specific learning disability or emotional disturbance (1), and severe educational problems (1). Eight studies involved yoga interventions with typically developing or at-risk youths. Seven were conducted in public or alternative schools in the United States, and the remaining were conducted in India (3), England (1), and Germany (1). The majority of studies evaluated were of low (7) to moderate quality (5) according to Sackett¹⁶ levels of evidence criteria. These standards were developed for clinical research and may fail to account for the complexity and challenges inherent in school-based research. For a synopsis of each study, see Appendix A.

Table 1. Methodological Quality by Study

Criteria	Berger et al. ²⁸	Clance et al. ⁵	Goldberg ¹³	Hopkins & Hopkins ²³	Manjunath & Telles ³⁰	Mendelson et al. ²⁷	Peck et al. ²⁹	Powell et al. ²²	Raghuraj & Telles ³¹	Scime & Cook-Cottone ⁹	Stueck and Gloeckner ²⁶	Uma et al. ²¹
Was the method of randomization well described and appropriate?	No	Yes	No	No	Yes	Yes	No	No	Yes	No	No	No
Was the outcome assessment described as blinded (B) or unblinded (UB)?	No	No	No	UB	UB	No	No	No	UB	No	No	No
Was the method of blinding of the assessment of outcomes well described and appropriate?	No	No	No	—	—	No	No	No	—	No	No	No
Was the sample size justified?	No	No	No	No	No	Yes	Yes	Yes	No	No	No	No
Was there a complete description of withdrawals and dropouts?	No	No	No	No	NR	Yes	No	Yes	Yes	Yes	No	No
Were withdrawals and dropouts <10%?	NR	Yes	Yes	NR	NR	Yes	Yes	Yes	Yes	Yes	NR	Yes
Was there intention-to-treat analysis?	No	No	No	No	NR	No	No	No	No	Yes	No	No
Was adherence to the yoga intervention (attendance or completion of sessions) >70%?	No	NR	Yes	NR	NR	No	Yes	NR	NR	No	Yes	Yes
Was there a manual or protocol used for yoga instruction?	No	No	No	No	No	No	Yes	NR	NR	No	No	No
Was treatment integrity measured?	No	No	No	No	NR	No	Yes	No	No	No	No	No
If so, was treatment integrity adequate?	—	—	—	—	—	—	Yes	—	—	—	—	—
Were outcome measures described?	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
If so, were they of adequate reliability (r > .70)?	No	No	NR	No	NR	Yes	Yes	NR	NR	Yes	No	NR

Note. NR, not reported.

Yoga Programs for Atypically Developing Children in Educational Settings

Clinical samples have been the typical foci of empirical studies of yoga programs. Few studies have been conducted for atypically developing children with special needs. These yoga programs are particularly noteworthy given the high degree of flexibility and therapeutic modification required by the variability within samples. Individuals diagnosed with autism spectrum disorder, as specified by the DSM-IV-TR, typically demonstrate deficits in social interaction, attenuated communication skills, and stereotyped patterns of behavior.¹⁹ This classification is highly variable and encompasses those with very mild symptoms as well as individuals with considerable impairment. With the increasing prevalence of diagnoses of autism, interest has grown in exploring unconventional treatments, including yoga.⁸

Goldberg’s Creative Relaxation yoga program, designed for children with autism, uses the following core principles: “Make a sacred space, engage the student, provide tools for success, and create opportunities for independence.”^{20(p68)} In a pilot study of 6 elementary school students who were diagnosed with autism and were experiencing difficulties under stress, involvement in the Creative Relaxation program was associated with parent and teacher ratings of

decreased levels of stress and significant reductions in pulse rate following completion of the program.¹³ Anecdotal reports by caregivers and teachers suggested that the skills learned in the school-based treatment program generalized to stressful situations in the home and in public. Results suggest that yoga is a potential adjunctive skill-building modality for children with autism.

Intellectual disability (ID) is defined in the DSM-IV-TR as having an IQ of approximately 70 or below, age of onset before 18 years of age, and co-occurring deficits or impairments in adaptive functioning.¹⁹ Adaptive functioning is characterized by the ability to interact within society and care for one’s self. Uma and colleagues implemented a matched-controlled study (*N* = 45 pairs) of children with ID to study the effect of yoga therapy on intelligence and measures of social adaptation. Participants in the yoga group attended yoga classes for 1 hour per day, 5 days per week for an entire academic year. Improvements in IQ and social adaptation were detected for the yoga group but not for controls, who evidenced declines over time.²¹ The methodological quality of this study was higher than most because of the larger sample size and the use of a matched-control group. Although the authors provided detailed information regarding the yoga intervention, little information regarding treatment integrity, feasibility, and adherence to the intervention

was provided. This study highlights the importance of studying the potential differential effects of dose response, because the cost of implementing a program this time and labor intensively may not be feasible in all contexts.

The Self-Discovery Programme integrates yoga, massage, and relaxation for children identified with special needs on the basis of emotional, behavioral, or learning problems. A quasi-experimental study of 107 children (yoga group $n = 53$) ranging in age from 8 to 11 years was conducted by Powell, Gilchrist, and Stapley. Intervention group children received one 45-minute intervention consisting of gentle poses, massage, and relaxation techniques per week for 12 weeks. Improvements in self-confidence, social confidence, communication, and contributions in class were detected for the intervention group, and improvements in self-control and attention/concentration skills were found in the control group.²² The authors note that children in the control group may have been receiving services outside of school, which may have confounded the results. This is an important consideration in conducting research with special-needs populations. Studies of higher methodological quality are needed to determine the impact of a yoga intervention above and beyond treatment as usual.

The earliest article included in this review outlined a study by Hopkins and Hopkins in which yoga was used as an adjunct treatment for elementary school children with severe “educational problems” who were attending an alternative learning setting. Children in the intervention group engaged in yoga poses and in breathing and guided imagery exercises, and controls participated in structured physical play. The authors reported improvements in attention and concentration after both the yoga and physical activity components of the program; however, the outcome measure used was highly susceptible to practice effects, rendering the results unreliable.²³

This compendium of research suggests that yoga instruction may prove beneficial for a wide range of behavioral, learning, and social problems commonly found in atypically developing children. Greater methodological rigor will enable researchers to more clearly identify which facets of yoga are most beneficial, and for whom.

Yoga Programs for Typically Developing Children in Educational Settings

Research has demonstrated that yoga programs may improve concentration,²⁴ stress management,¹³ and social and intellectual functioning²¹ for atypically developing youth. The salutogenic model of wellness encourages promoting healthy behaviors that increase well-being in the general population.¹¹ The following review illustrates what is currently known from the extant literature regarding the

delivery of yoga programs in schools.

Although it has already been demonstrated that yoga can modulate psychosocial symptoms, such as stress and anxiety in adults,²⁵ fewer studies have examined the impact of yoga participation on the psychosocial adjustment of children. Scime and Cook-Cottone developed a primary prevention program for fifth grade girls that targeted eating-disordered behaviors.⁹ Seventy-five of 144 fifth grade girls were assigned to attend 90-minute classes that included yoga, relaxation, information about media influences, and interactive discussion about a variety of topics for 10 consecutive weeks. Participant self-reports suggested longitudinal decreases in body dissatisfaction and dysfunctional eating behaviors and increases in perceived self-concept. Between-group differences in drive for thinness, perceived stress, and competence were not detected.⁹ The direct emotional benefits of yoga cannot be teased apart from those of other strategies, including a media education component and interactive discourse. Findings raise an important consideration when conducting research with typical children. Measures may lack the sensitivity to detect effects in samples with reduced variability because of a lack of cognitive, behavioral, or mood problems.

Interventions for at-risk, subclinical samples may help identify the mechanisms responsible for increasing the likelihood that children will develop disordered behaviors. Clance, Mitchell, and Engelman investigated the use of yoga and awareness training for a group of 12 third grade African American youths who demonstrated low body dissatisfaction and physical coordination.⁵ Children were randomly assigned to an experimental condition ($n = 6$) in which they participated in body awareness exercises, guided imagery, and yoga postures. Control group students attended physical education classes as usual. Children in the experimental group reported decreases in dissatisfaction with the bodily parts and processes that they had disliked. Between-group differences were not reported, preventing interpretation of the effectiveness of the intervention relative to traditional physical education.

In an examination of the benefits of a yoga program on a number of physical and psycho-emotional dimensions, Stueck and Gloeckner randomly assigned fifth graders who scored high on an anxiety questionnaire to the Training of Relaxation with Elements of Yoga for Children program or a no-treatment condition. Participants in the intervention condition participated in fifteen 60-minute sessions that entailed relaxation exercises, 23 yoga postures, and social interaction. Training emphasized self-regulation strategies to reduce stress in response to daily events and psychologically demanding experiences. Longitudinal results provided evidence of increases in emotional balance and decreases in anxiety and several other factors. Statistical analyses were

vaguely defined and incomplete, making between-group differences difficult to interpret.²⁶

Urban youths are known to be at risk for myriad emotional and behavioral difficulties. Mendelson and colleagues randomly assigned 55 fourth graders and 42 fifth graders (59 = female) to attend a 45-minute mindfulness program 4 days per week for 12 weeks. The intervention consisted of guided mindfulness practices, breathing techniques, and yoga-based physical activity. Preliminary outcomes revealed that intervention youths demonstrated lower levels of problematic involuntary engagement (rumination, intrusive thoughts, emotional arousal, impulsive action, and physiologic arousal) following the program. Significant between-group differences for peer and teacher relationships and negative affect or depressive symptoms were not found. Perhaps more important, authors reported encouraging findings regarding the feasibility and acceptability of teaching yoga programs in public elementary schools.²⁷

Berger and colleagues evaluated an after-school yoga program delivered to inner-city children in New York City. Children were randomized to 12 weeks of 1 hour per week yoga instruction or a no-intervention control group. Subjective measures yielded reductions in negative behavior scores and increases in balance control for the yoga group, compared with controls. Improvements in global self-worth and perceptions of physical well-being were not detected.²⁸ Collectively, these studies provide preliminary evidence for the protective effects of yoga practices for children residing in high-risk environments and suggest fertile ground for additional prevention and intervention research.

Participation in yoga programs has also been associated with changes in academic performance and cognitive development. Peck and colleagues²⁹ used a multiple baseline design to evaluate Yoga Fitness for Kids, a videotaped program designed for use with students in the classroom. The intervention provided 30 minutes of instruction in physical yoga postures, deep breathing, and relaxation. Children participated in the intervention 2 times per week for a total of 3 weeks. Ten children between first and third grades who exhibited attention problems in the classroom were included.²⁹ Results indicated large effect sizes for each grade level group on pre- and postscores of time on task (ranging from 1.51 to 2.72). Although these effect sizes decreased at follow-up, they still remained moderate to large. Furthermore, peer comparison data did not show any change in time-on-task behavior throughout the assessment.²⁹ Although these results indicate an improvement in concentration as a function of yoga treatment, studies with larger sample sizes are required to further evaluate the benefits of this program.

Last, the impact of school-based yoga interventions on planning³⁰ and depth perception³¹ are worth noting. Manjunath and Telles evaluated the impact of a 75-minute,

7-day-per-week yoga intervention delivered to a sample of 20 residential schoolgirls ranging in age from 10 to 13 years, for a period of 1 month. The intervention included yoga postures, relaxation, breathing and cleansing exercises, and song. A comparison group engaged in physical activity for the same duration. Planning and execution efficiency were evaluated using the Tower of London task. Students in the yoga group demonstrated statistically significant postintervention improvement in planning and execution times, compared with a randomized control group.³⁰ Following a similar yoga intervention, Raghuraj and Telles also reported significant improvement in depth perception among participants, compared with matched controls.³¹ Combined, these studies suggest yoga may have positive effects on executive functioning and depth perception in school-age girls.

Literature reviewed suggests that participation in a yoga program in typical classroom settings can enhance children's body satisfaction, emotional balance, attentional control, and cognitive efficiency and decrease anxiety, negative thought patterns, emotional and physical arousal, and reactivity and negative behavior. As such, participation in yoga programs may serve as a protective factor for typically developing or at-risk youths. Longitudinal randomized controlled trials with strong methodological strategies are required to understand the health benefits of yoga programs delivered in the classroom.

Discussion

Twelve peer-reviewed, published studies in which yoga and a meditative component (breathing practices or meditation) were taught to youths in a school setting were identified. Study formats included pilot studies, single cohort, quasi-experimental, and randomized clinical trials. Samples for whom yoga was implemented as an intervention included youths with autism, intellectual disability, learning disability, and emotional disturbance, as well as typically developing youths. Although effects of participating in school-based yoga programs appeared to be beneficial for the most part, methodological limitations, including lack of randomization, small samples, limited detail regarding the intervention, and statistical ambiguities, precluded our ability to provide definitive conclusions or recommendations.

This review categorized children on the basis of atypical and typical developmental trajectories. The atypical development category was represented by children diagnosed with autism and other learning, emotional, and behavioral disorders. Though a great deal of variability occurred relative to the types of programs delivered and their frequency, positive results appeared to be associated with participation in a yoga program. In particular, children diagnosed with autism evidenced reduced stress and low-

ered pulse rate, and those with intellectual disabilities demonstrated elevations in IQ ratings and social adaptation scores. Children with emotional, behavioral, and learning problems were rated as exhibiting greater self- and social confidence and improved communication and contribution in the classroom. Those with severe educational problems illustrated improvements in attention and concentration following a yoga intervention.

Positive effects were also detected for typically developing children in a variety of dimensions. Participation in a yoga program was associated with decreased body dissatisfaction, anxiety, and negative behavior and increased perceived self-concept and emotional balance. Inner city children evidenced reductions in cognitive disturbances, such as rumination and intrusive thoughts, and decreased emotional and physical arousal and impulsivity following a mindfulness intervention.

Although generally supportive, the empirical evidence for the utility of using yoga instruction in educational settings is inconclusive. A lack of methodological and statistical rigor, small sample sizes, absence of systematic randomization, and a high degree of variability between intervention methods undermine our ability to evaluate the effects of yoga for a particular population. Future research must assess both the concurrent and longitudinal effects of receiving yoga instruction in the classroom by using randomized controlled trials that include a multitrait, multimethod assessment strategy. These interventions require greater standardization and explanation and must account for factors such as adherence, attrition, and treatment fidelity. Dosage—length of classes, frequency of sessions, and duration require examination. The unique contributions of the various components of yoga programs (i.e., breath work, postures, relaxation techniques, and medication) and differences between methods of yoga instruction (e.g., Hatha, Ashtanga, Anusara, Iyengar, Bikram) also require consideration. And last, future studies must address the question of which types of school-based programs are developmentally appropriate, for whom, and under what conditions.

Yoga in school settings must involve the support of stakeholders such as parents, teachers, administrators, and, most important, children. This can be accomplished only in the presence of sound empirical research that proves yoga instruction to be a cost-effective, pragmatic, and beneficial tool in the academic setting and beyond. Through concerted effort we can impart the wisdom of yoga practices to the young and afford them the tools to lead successful, healthy, and happy lives.

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Appendix A

Description of Studies, Interventions and Outcomes for Reviewed School-Based Yoga Intervention Literature

Study	IDEA Classification	Location/ Setting	Method	Participants	Yoga Intervention (treatment components, duration, and number of sessions)	Dependent Variables	Summary	Sackett Level
Berger et al. ²⁸	None	United States/ after-school program	Pilot quasi-experimental design	71 fourth and fifth grade students (47 females, 24 males); control group (n = 32); experimental group (n = 39); majority were Hispanic	Poses, breathing, meditation, relaxation; 60-minute sessions, 1 time per week, 12 weeks	Self-perception of global self-worth (measured by self-report on SPPC) and physical well-being (measured by the Perceptions of Physical Health scale and flexibility and balance assessment); independent t-tests (p < .05) used for statistical analyses	No significant differences found in global self-worth and perceptions of physical well-being. Intervention group reported significantly fewer negative behaviors in response to stress, better balance	3B
Clance et al. ⁵	None (all exhibited low body satisfaction and physical coordination)	United States/ public elementary school	Random assignment; experimental design	12 African American third grade students (10 females, 2 males); random assignment to control group (n = 6) or experimental group (n = 6)	Poses, relaxation, reflection, massage; 30-minute sessions, 3 times per week, 3 weeks.	Body dissatisfaction measured by Child's Body Satisfaction test and Human Figure Drawings. Independent t-tests (< .01) used for statistical analyses	Significant decrease in body dissatisfaction from pre- to posttest observed only in experimental group (based on number of subjective response pre- and posttest). Significant decrease in emotional indicators of body dissatisfaction for yoga group, indicating increase in body satisfaction	2B
Goldberg ¹³	Autism	United States/ public elementary school	Single-cohort design	6 upper elementary school children; all diagnosed with autism, identified as experiencing anxiety under stress; no information about gender	<i>Creative Relaxation</i> program: yoga exercises, breathing, role-playing, guided imagery, discussion, music, visual aides; sessions were 30 minutes, 3 times per week, 8 weeks	Teacher and parent ratings (measures unidified); measurements of pulse rates before and after sessions; observations of breathing and muscle tone (before, during, after session); teachers' observations of overt signs of stress vs. relax-	Results suggest lower stress levels after completion of treatment evidenced by improvement in rating scales and statistically significant decrease in pulse rate. Anecdotal reports suggest skills children learn in school-based treatment program	4

Study	IDEA Classification	Location/ Setting	Method	Participants	Yoga Intervention (treatment components, duration, and number of sessions)	Dependent Variables	Summary	Sackett Level
						ation in target situations; qualitative reports from parents and teachers; 2-sample <i>t</i> -tests ($p < .01$) used for statistical analyses	generalize to stressful situations in home and in public.	
Hopkins & Hopkins ²³	Not stated (Exhibited severe “educational problems”)	United States/ Impact Center (alternative learning center for children with severe educational difficulties)	Within-groups, counter-balanced design	34 children placed in an educational Impact Center; no information about gender; ages 6–11	Poses, breathing, imagery; comparison activity involved gross motor activities, such as games; children received either psychomotor activity or yoga for 15 minutes (no information provided about length or duration of program)	IQ, achievement, age controlled for; attention and concentration as measured by alphabetic coding task; 3-way ANOVA for statistical analyses	No significant differences found between groups in attention and concentration. Children demonstrated significant improvement following psychomotor and yoga interventions. Results are difficult to interpret because alphabetic coding task used to assess attention and concentration was subject to practice effects	4
Manjunath & Telles ³⁰	None	India/ residential school	Random assignment, experimental 2-group design	0 female children; no information about final number of students in each group; ages 10–13	Yoga included poses, relaxation, breathing, internal cleansing, songs; comparison group included physical activity; sessions lasted 75 minutes, 7 days per week, 1 month	Planning time, execution time, number of moves as assessed on the Tower of London task; Wilcoxon paired signed ranks test used for statistical analyses	Yoga group showed significant decrease in planning and execution time and number of moves. Physical activity group showed no change	2B
Mendelson et al. ²⁷	None	United States/ public elementary schools	Pilot random assignment by school experimental control design	97 fourth and fifth graders (60% female); random assignment to control group ($n = 46$) or intervention group ($n = 51$); urban communities	Poses, breathing, guided mindfulness practices; sessions were 45 minutes, 4 days per week, 12 weeks	Overall adjustment as defined by affective, cognitive, social-emotional, and behavioral components; all measured by self-report (RSQ; SMFQ-C; PIML); ANOVA and Turkey adjusted pairwise comparisons used for statistical analyses	Significant reductions in involuntary stress reactions for intervention group, no differences in changes for mood or relationships with teachers or peers	2B
Peck et al. ²⁹	None (all had attention problems)	United States/ public elementary school	Within-groups, multiple-baseline design with comparison group	10 elementary school children (7 females, 3 males) in yoga group (no information about comparison group); Grades 1 to 3; all evidenced subclinical attention problems (<80% of time on task)	<i>Yoga Fitness for Kids</i> video program: deep breathing, physical postures, relaxation exercises; Sessions were 30 minutes, twice a week, 3 weeks	Time on task (defined as orienting toward teacher and working on assignments) measured by structured classroom observations (Behavioral Observation Form; Rhode et al.); outcome analyses according to Cohen’s guidelines for effect sizes	Large effect sizes for each grade level group on pre- and postscores of time on task (from 1.51 to 2.72). Although these effect sizes decreased at follow-up, they remained moderate to large. Peer comparison data indicated classmates’ time on task unchanged	4

Study	IDEA Classification	Location/ Setting	Method	Participants	Yoga Intervention (treatment components, duration, and number of sessions)	Dependent Variables	Summary	Sackett Level
Powell et al. ²²	Learning Disability or Emotional Disturbance	England/ public primary schools	Quasi-experimental control study	107 children (59 males, 48 females); control group ($n = 54$); treatment group ($n = 53$); ages 8–11; 3 children on medication	Massage, poses, relaxation; sessions lasted 45 minutes, 1 time per week, 12 weeks	Self- and social confidence, communication and interaction abilities, ability to control self in school/classroom, attention span, emotional symptoms, conduct problems, hyperactivity and peer relationship problems; assessed by behavioral profiles and questionnaire (SDQ); Analyses included independent sample t -tests ($p < .05$) and chi-square tests	Intervention group had significant improvements in mean scores on self-confidence, confidence with teachers, communication with peers and teacher, contributions in classroom, compared with the control group	4
Raghuraj & Telles ³¹	None	India/ residential school	Matched pairs with random assignment	32 females from a residential school; control group ($n = 16$), experimental group ($n = 16$); ages 10–11; all had normal vision	Poses, breathing, internal cleansing exercises, Intervention included AM and PM sessions (75 minutes per day), 7 days per week, for a period of 1 month; Control group participated in physical training exercises.	Depth perception assessed by 5 separate trials using a standard electronic apparatus (Model DP 129); analyses using Wilcoxon signed-rank test, Kruskal-Wallis test for tied ranks, and non-parametric Turkey test	Error of depth perception significantly reduced in yoga group in 3 of 5 trials. No significant change or difference between groups in remaining 2 trials	2B
Scime & Cook-Cottone ⁹	None (primary prevention group)	United States/ after-school program	Quasi-experimental design	141 fifth grade females; control group, $n = 69$; experimental group, $n = 72$	Yoga, media literacy, relaxation, and interactive discourse; Sessions were 90 minutes long, 1 time per week, for 10 weeks.	Self-competence, social self-concept, physical self-concept, current and future intentions of eating-disordered behavior, perceived stress scale assessed by self-report (MSCS; EDI-2; current and Future Intentions Scale; PSS); statistical analyses using ANOVAs	Significant decrease on scales measuring body dissatisfaction and bulimia (attitudes toward, not behavior), increase on social self-concept scale. Perceived stress, drive for thinness, and competence not affected	3B
Stueck & Gloeckner ²⁶	None (All exhibited elevated signs of anxiety)	Germany/ public school	Quasi-experimental control study	48 fifth grade students; participation in control group, $n = 27$; experimental group, $n = 21$; no information about gender	<i>Training of Relaxation with Elements of Yoga for Children</i> : breathing, imagination journeys, and yoga poses; 60-minute sessions, for 15 total sessions.	Psychological and physiological variables (e.g., relaxation states, concentration, general well-being, electrodermal activity; measures not specified); pre-posttests of analysis	Results support use of yoga in emotional regulation, show significant decreases for experimental group in aggression, helplessness in school, physical complaints, and increases in stress-coping ability	3B
Uma et al. ²¹	Intellectually Disabled	India/ special education schools	Matched pairs with random assignment	45 matched pairs (29 male pairs, 16 female); children identified as ID; ages 6–15	Breathing, exercises, and meditations; Sessions were 60 minutes, 5 times per week, for 1 academic year.	Intelligence and social behavior measured by standardized assessments (Binet Kamath; Seguin Form Board) and parent/teacher reports (Vineland social maturity scale); statistical analyses using paired t -tests and chi-square test	Significant improvements on IQ and social adaptation measures in treatment group compared with control group. Control group measures suggested deterioration over time	2B

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Yoga Therapy in Practice

YogaHome: Teaching and Research Challenges in a Yoga Program with Homeless Adults

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Abstract

YogaHome is a therapeutic yoga program for homeless women. Developing and refining YogaHome provided a unique opportunity to explore the process of teaching yoga to women faced with the physical and emotional stress of living in a homeless shelter. Unique teaching and research challenges are presented and recommendations for future programs are discussed.

Key Words: Yoga, homelessness, depression, anxiety

YogaHome originated as a pilot study designed to examine the feasibility of teaching yoga to adult women who used services at a homeless shelter. Program goals were twofold and built upon prior examination of the unpredictable nature of shelter life.¹ The first goal was to provide a temporary, safe context for participants so they could learn stress-relief techniques to improve their overall health and vitality. The second goal was to test the effectiveness of the YogaHome program for individuals residing in homeless shelters and provide a blueprint for further research.

Numerous studies document the positive connection between yoga and a variety of life-enhancing dimensions. Regular yoga practice has been positively correlated with improvements in self-reported quality of life,² linked with enhanced self-esteem among middle-aged women,³ and associated with reduced stress for university students, staff and faculty,⁴ and medical students.⁵ Yoga has also been shown to be particularly beneficial for elderly adults, and increased muscle strength, range of motion, and physical and mental health are reported among this population following regular yoga practice.^{6,7}

Engaging in yoga has also been found to benefit individuals' psychoemotional well-being and has been associated with increases in positive mood and decreases in anxiety. For healthy participants, regular yoga practice is related to increased gamma-aminobutyric acid (GABA) levels, which are linked to lower levels of depression and anxiety.⁸ A growing body of research points to the beneficial effects of practicing yoga for those with depression and anxiety.⁹⁻¹¹ Yoga-based interventions may also be useful for individuals experiencing posttraumatic stress disorder.^{12,13}

Research outcomes also attest to the benefits of yoga for vulnerable individuals, including the economically disadvantaged, homeless, and institutionalized. A 12-week, randomized intervention conducted at 4 inner city schools revealed that youths participating in yoga classes reported lower levels of rumination, intrusive thinking, and general emotionality in response to stress than did those in the control group.¹⁴ Another pilot study that examined the effects of a 12-week, after-school yoga program on inner city fourth and fifth graders showed no significant changes in self-worth and perceived well-being between intervention

and control students. However, yoga group participants reported fewer negative behaviors in response to stress and increased levels of well-being compared with controls.¹⁵ Collectively, these studies provide preliminary evidence of the mental health benefits for inner city youths participating in a yoga program.

A study of incarcerated women demonstrated the difficulty of conducting research with a vulnerable population. Although 17 incarcerated women were recruited to participate in a yoga program, only 6 completed the 12-week intervention. Self-report measures of depression and anxiety indicated some reduction of symptoms for the 6 completers, but findings were not reported for the remaining 11 noncompleters. These outcomes point to the difficulty of conducting systematic, longitudinal research with persons transitioning in and out of temporary living situations.¹⁶

Working with Homeless Persons

Data from Housing and Urban Development (HUD) and the National Survey of Homeless Assistance Providers and Clients (NSHAPC) suggest that homelessness affects individuals of all ages and stages of life.¹⁷ Increased housing cost burden, unemployment, and foreclosure rates, coupled with declining incomes, have contributed to the rise in homelessness in the United States. Nationally, about 19% of homeless persons are considered chronically homeless. This phenomenon has resulted from lack of affordable housing and from the effects of low income, mental illness, and disability. Unfortunately, chronically homeless individuals are more likely to suffer from mental health and co-occurring substance use disorders than are individuals with stable housing.¹⁸

Life in the shelter system is physically and emotionally demanding and chaotic. Many residents struggle with substance use and addiction, are faced with mental and physical illness and disability, and encounter environments characterized by high levels of noise and potential for physical harm. Elevated levels of stress and threat tax individuals' physical and psychological resources to the extent that they are often unable to engage in restorative behaviors, including sleep.

Yoga programs have emerged to facilitate the development of stress reduction skills to cope with homelessness. In 2002, Streetyoga was founded at a day shelter and school to serve youths and their families who were homeless, caught up in poverty, or struggling with abuse, addiction, or trauma.¹⁹ The Integrative Restoration Institute (iRest) yoga program²⁰ also provides skills to individuals dealing with heightened levels of trauma and stress. The iRest approach has been offered to homeless populations in a few states, but most notably in California in collaboration with the Committee on the Shelterless.²¹

A number of considerations emerge when intervention studies are developed and conducted with vulnerable and transient populations. The high mobility of homeless individuals tends to make sample sizes small, and attrition is also a common problem. As such, the systematic collection of longitudinal data is nearly impossible. A high degree of physical, psychological, and demographic variability among individuals residing in homeless shelters renders data collection particularly challenging. In this article we report about the development and implementation of the YogaHome program. Program development and implementation and the challenges of data collection are discussed, as are lessons learned and goals for future research.

YogaHome Program Development

Early in its development, the YogaHome project drew from published accounts of yoga programs for vulnerable populations. The initial intention was to offer 6 weeks of yoga classes that successively built upon previous lessons. Participants were to be recruited from a single homeless shelter, and assessment was to occur prior to and following delivery of the program.

Participants. Participants were recruited from an overnight shelter for women and children in a medium-size midwestern city in the United States. This shelter serves single women and mothers and their children. Occasionally, husbands were permitted to share housing with their wives. At present, the women and children's shelter has 220 beds. Single women are housed in a dorm-like setting and sleep in a large room on twin beds. Women with children are housed separately.²²

Methods. Following approval by the University of Dayton institutional review board, project staff consisting of a licensed social worker and a certified Integrated Yoga Therapist obtained permission from the shelter to offer a 6-week yoga program offered 1 time per week. Women were recruited for the study by word of mouth from shelter staff and signs that announced the date and time of the classes. After a list of interested volunteers was compiled, the social worker met with each woman prior to onset of the project to describe the study, obtain informed consent, and administer the Beck Depression Inventory II²³ and the Beck Anxiety Inventory²⁴ to the enrollees. Questions were orally administered to accommodate the generally low literacy levels among participants.

Shortly following onset of the project, it became clear that participant attrition posed a threat to regular attendance and data collection. Some participants secured housing elsewhere, and others had scheduling conflicts, illness, or other life events that precluded their attendance. Consequently we reverted to an open enrollment method in which anyone

who expressed interest in a class on any given day was invited to attend. As a result there was a great deal of fluctuation with regard to student participation and continuity.

To date, 52 individuals (50 females) have participated in the YogaHome program. Two husbands of women in the group attended after they expressed interest in learning the skills offered in the program. Age of participants ranged from 19 to 59 years, and the average age was 42. The number of sessions attended ranged from 1 to 20. Sixteen students were Caucasian, 34 African American, and 2 were of American Indian descent. Physical ability of the students varied widely. Many participants were overweight and had numerous health and mobility issues. Most had never attended a yoga class.

YogaHome Program. Classes were offered on site at the shelter. Sessions were offered 1 time per week and each class was 1 hour in duration. Duration of each class and the interval between them were determined based on space availability and other administrative factors. All sessions were taught by a certified yoga instructor who was assisted by a social worker. The program was designed with the following goals in mind:

1. Provide a safe, peaceful context for practice.
2. Cultivate relaxation and repose by activating the parasympathetic nervous system through breathing exercises and gentle asana.
3. Develop body awareness.
4. Initiate an understanding of the connection between body, mind, and breath.
5. Impart simple, easy-to-remember techniques for relieving stress and reducing intense emotional reactivity to stress.
6. Reduce pain and increase strength and flexibility.
7. Enhance overall health and well-being.

In keeping with prior experience working with occupants of this homeless shelter, the design of the YogaHome program adhered to the following guidelines:

1. Provide clear and simple instructions with demonstrations of each posture and potential modifications.
2. Offer instruction in concise language without using Sanskrit terminology.
3. Avoid use of chanting.
4. Be playful and light hearted.
5. Conclude with guided imagery.
6. Build upon student strengths through modification of postures.

Challenges

Program delivery. A sample practice is offered in Appendix A. A number of insights were gained during the

course of offering the YogaHome program. Most notably, the transient nature of participants precluded the delivery of a program in which skills could be accumulated, and the continuous fluctuation of the sample prohibited the possibility of systematic longitudinal data collection. In addition, conflicting priorities, ongoing life events, and, in some cases, substance use, made it very difficult to achieve the continuity of participants originally envisioned. Vastly different levels of physical ability and psychological adjustment had to be regularly accommodated because group constitution varied for each class.

As a result, program goals, design, and approach were reformulated to meet the unique needs of this population. An open enrollment method was instantiated such that all interested parties could attend the classes. The instructor taught at an introductory level and made extensive use of modifications for each posture to ensure that students could participate whether they were on the floor, in a chair, or standing. As such, it was essential to have an instructor and assistant present at all times.

Serious illness and injury were also characteristics of residents of this homeless shelter. Instructors assessed the parameters of safe practice for students presenting with recent physical trauma and for those with chronic illness, such as diabetes, hypertension, and kidney failure, or acute illnesses, including bronchitis, sinus infections, and severe coughs. Instructors were required to provide safe, responsive instruction while simultaneously monitoring safety considerations and providing encouragement.

Individuals residing in this homeless shelter also demonstrated high levels of mental health concerns and substance use. Instructors encountered students experiencing depression, anxiety, suicidality, drug and alcohol use, and symptoms of severe psychiatric illness. Some participants presented with lower energy levels, and others appeared activated. Many demonstrated some level of cognitive or neurologic impairment. The complex and varying needs of the students underscored the importance of having a mental health professional present to monitor and address potentially dangerous situations or behaviors.

Several measures were implemented to maintain a safe environment for students to practice yoga. Policies were instituted regarding turning off electronic devices and maintaining appropriate conduct, and they were enforced when necessary. Instructors responded to events without judgment while reiterating the need to maintain order. Despite the unpredictable nature of the shelter and the variability of its occupants, very few serious disruptions were encountered.

Data collection. It had been intended that collection of data regarding participants' depression and anxiety would occur prior to and immediately following delivery of the

YogaHome program. Participants were administered the Beck Depression Inventory II²³ (BDI) and the Beck Anxiety Inventory²⁴ (BAI) in advance of the first class. After it was decided to change the participation strategy to open enrollment, administration of the BDI and the BAI was required for all newcomers. The inventories were read to all participants. The BDI comprises 21 items with ratings ranging from 0 to 3. Ratings for each item were summed for total scores (range 0–63) and were interpreted as ranging from minimal depression to severe depression.^{23,24}

Prior to each class, students completed the Health and Well-Being Survey developed by the Yoga Activist organization.²⁵ The survey asks respondents to rate their pain, the effect of their health status on their ability to relax, the effects of stress on daily activities, and general stress levels on a scale ranging from 1 (*not at all*) to 10 (*severe*). Following class, participants were asked to rate their physical pain and extent of relaxation and stress using the identical measure.²⁵

This method of data collection proved to be impractical. Consequently use of the BDI, BAI, and the Health Survey was discontinued. A Yoga Class Survey was developed that asked participants to rate their pain, stress, emotional state, and energy level before and after class on a 4-point scale (see Appendix B). Participants were then asked to indicate if they thought breathing, stretching, or meditation benefited them during the class and whether or not these skills might be useful in the future. This survey continues to be used weekly to solicit feedback from participants.

Because of the high rates of student transition and attrition, we were unable to systematically collect pre- and postquantitative data. Qualitative data were collected by using semistructured, in-person interviews from students who attended at least 4 yoga classes. Respondents were asked to discuss their motivation for attending the classes and what they enjoyed most and least about the program. They were then asked to discuss any physical, emotional, or spiritual effects of practicing yoga, to offer suggestions for improvement, and to relate which skills they might continue to use. These interviews appear to hold the most promise in terms of facilitating our understanding of the impact of this program and potential targets for revision or improvement. Each participant who attends more than 4 sessions will continue to be asked to complete this interview.

Discussion

The development and refinement of the YogaHome program continues. The original paradigm for program delivery and evaluation evolved in response to the challenges discussed earlier in this article and continues to transform in response to student feedback. What originated as a

structured, 6-week study of the effects of yoga on residents of a homeless shelter has become a program of indefinite duration.

This experience taught us a great deal about adapting yoga practices to the needs of the homeless. Hopefully these experiences will guide the development of other yoga programs for individuals residing in homeless shelters. It is also hoped that other researchers will benefit from the elucidation of the pitfalls we encountered during the delivery and evaluation of the YogaHome program.

Perhaps the greatest impact of the YogaHome program was on those who designed and implemented it. We were challenged to examine our assumptions regarding teaching yoga to, and conducting research with, homeless individuals. We learned to appreciate the courage and struggle of those coping with adverse life circumstances. Although it was our intention to conduct empirical research, we discovered that profound transformation often occurs where the paths of student and teacher intersect, and our lives have been immeasurably touched.

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Appendix A

Sample YogaHome Class Structure

Opening (5 minutes)

1. Welcome and check in
2. Paperwork and consent forms for new participants, before class surveys

Yoga Practice (40 minutes)

Grounding, settling, centering, transition from stressful day (10 minutes)

- Body Scan to develop body awareness, make friends with the body, observe what is going on (3 minutes)
- Chinmaya Mudra of Chin Mudra for grounding, settling, and centering (5 minutes for mudra and breath)
- Breath awareness
Observing the breath
Kaki Breath with exhale through the mouth or Bee Breath/humming on exhale to slow exhalation and trigger parasympathetic nervous system response
- Raise and lower arms with inhale and exhale to develop awareness of breathing with movement (3 reps)

Warm Up (sitting on floor or in chair)

- Shoulder rolls (5 x both front and back)
- Hand movements: open and close palms, move fingers, rotate wrists (5 x each movement)
- Feet: flex and point toes, rotate feet at ankles (5 x each)
- Spine: stretch arms overhead and bend forward with ears between arms, instruct to keep back straight, not round shoulders, as many people have back problems (2-3 x, alternate with next movement of spinal extension)
- Spine: hands behind you on the floor or chair and lift chest, extending spine
- Spine: lateral stretch to each side (1 x each side)
- Spine: gentle twist; those on floor, twist with extended leg; those in chair, twist to side. For challenge, can be instructed to do full twist (half Lord of the Fishes; 2-3 x each side)
- Hips: Rock the Baby, holding bent leg and rocking side to side to open hip (5 x)
- Hips: one bent-leg forward bend, or in chair can put one foot on top of other leg, knee out to side (1-2 x each side)
- Neck: head rotations in vertical plane, or ear to shoulder, chin to chest, moving with the breath (3 x each)

Asana (floor or chair)

- Lion: 3 x, each getting progressively louder, then everyone laughs, great tension reliever
- Cat Stretch (on hands and knees or in chair). For challenge, can extend legs behind and/or Sunbird (5 x)
- Leg stretches with ties, on back on floor, or in chair (hold 30 seconds)
- Elbow to knee on back or can be done in chair (2-3 x each side)
- Bridge: do carefully, raising hips only a comfortable height. In chair can repeat Cat Stretch (1)

- Downward Dog for those needing challenge, or standing with hands against wall or back of chair and stretch spine (1)

Asana (standing or chair)

- Massage feet with racquet ball (they love this)
- Mountain pose, arms overhead (hold 10 seconds)
- Standing forward bend with hands behind back, shoulder blades together, coming forward only half way. Repeat for those who want to bend forward to the floor. Encourage students to make the right choice for themselves (1–2 x)
- Chest Expander (1 x)
- Crescent Moon, lateral stretches (1 each side)
- Standing twist with arms out to the side with mudra to align spine (1 each side)
- Modified triangle, upper arm can be bent with hand at waist if shoulder problems. Can be done in chair (1 each side)
- Balancing: Stork, standing near wall for support, instruct that practicing body balance can help balance the mind (1 each side)
- Slow roll down

Cool Down (on floor or in chair)

- On back on floor, elbow to knees 2–3 times

Savasana/Meditation (10 minutes)

Get comfortable. Instruct that they can keep knees bent if that is most comfortable. Those in chairs tend to lean back and open chest a little, hanging arms at sides. We do not have props in class.

- Tune in to breathing
- Relax body part by part
- Guided visualization

Closing (5 minutes)

1. Anjali Mudra/Namaste
2. How are you feeling?
3. Fill out after class section of the Yoga Survey
4. Give out socks
5. Give hugs

Appendix B

YOGA CLASS SURVEY

NAME _____ DATE _____

BEFORE CLASS

PAIN LEVEL: How would you describe your pain at this time? (circle one)

1. None 2. A little 3. Moderate 4. A lot

STRESS LEVEL: How would you describe your stress at this time? (circle one)

1. None 2. A little 3. Moderate 4. A lot

EMOTIONS: How emotional do you feel today?

1. None 2. A little 3. Moderate 4. A lot

ENERGY/FATIGUE LEVEL: How tired do you feel today?

1. None 2. A little 3. Moderate 4. A lot

AFTER CLASS

PAIN LEVEL: How would you describe your pain now? (circle one)

1. None 2. A little 3. Moderate 4. A lot

STRESS LEVEL: How stressed do you feel now?

1. None 2. A little 3. Moderate 4. A lot

EMOTIONS: How emotional do you feel now?

1. None 2. A little 3. Moderate 4. A lot

ENERGY/FATIGUE LEVEL: How tired do you feel now?

1. None 2. A little 3. Moderate 4. A lot

RELAXATION SKILLS

Which of the following do you feel helped you today? (circle all that apply)

- Breathing exercises Stretching Meditation Strengthening

Which of the following do you think you will be able to use in your daily life? (circle all that apply)

- Breathing exercises Stretching Meditation Strengthening

Would you recommend this class to others? (circle one) Yes No



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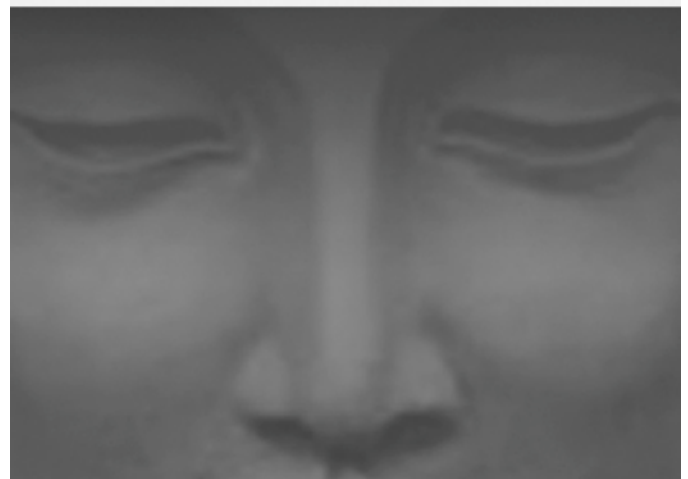
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Instructions to Contributors

Content

International Journal of Yoga Therapy publishes articles about yoga therapy, yoga practice, and yoga philosophy. We encourage original submissions from yoga therapists, yoga teachers, researchers, and healthcare professionals. The journal aims to represent views, practices, and research from all major traditions in yoga and from modern healthcare, integrative medicine, and psychology.

Research

The journal publishes reports of original research. We welcome articles about pilot studies and preliminary reports about research in progress, when these reports examine challenges and early findings that may benefit other researchers and practitioners. Case studies should be reported in the context of a thorough review of the relevant literature and a broader discussion of the cases' implications for future research or practice. Names and other identifying information should be changed to protect individuals' privacy.

Issues in Yoga Therapy

The journal welcomes scholarly articles that address issues, challenges, and controversies in the research and practice of yoga therapy. Articles in this category include, but are not limited to, considerations of policy issues related to the integration of yoga and healthcare, explorations of common challenges that yoga therapists and teachers face in their work, and discussions of yoga philosophy as it relates to contemporary yoga therapy practice.

Yoga Therapy in Practice

Yoga Therapy in Practice articles should review a topic of importance and relevance to practicing yoga teachers, yoga therapists, and healthcare providers. Articles in this category include, but are not limited to, discussions of specific populations or medical conditions and recommended best practices, reviews of research on a topic of relevance to yoga therapy, or reviews of the history of some aspect of yoga therapy or yoga philosophy. Articles should be supported by references to published research, research in progress, established interventions at yoga therapy clinics, classical yoga texts, and/or original interviews and should not be based solely on the experience or opinions of the author(s). Review articles must contribute something new to the literature.

Perspectives

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