Original Article

Feasibility Trial of a 10-Week Adaptive Yoga Intervention Developed for Patients with Chronic Pain

Sara F. Hall, MS, APRN-BC, CNS [*], Bethany A. Wiering, BA [†], Lauren O. Erickson, MS [‡], Leah R. Hanson, PhD [†]

[*] Pain Management Department, Regions Hospital, St. Paul, Minnesota, USA
[†] HealthPartners Neuroscience Research Center, HealthPartners Neuroscience Center, St. Paul, Minnesota, USA
[‡] HealthPartners Institute, Bloomington, Minnesota, USA

ABSTRACT

Background: This study assessed the feasibility of implementing a yoga intervention adapted for participants diagnosed with chronic pain in a large Midwest neuroscience pain clinic. Although conducted using a small convenience sample, this was a novel program in that it was led by an advanced practice nurse certified in pain management and to teach yoga. She was therefore uniquely qualified to tailor the yoga practice to suit individual needs of study participants.
Design: The intervention consisted of a weekly 1-hour class for 10 weeks. Feasibility measures included patient recruitment, program adherence, patient satisfaction, global impression of change, and likelihood of continuing yoga practice. In addition, it was hypothesized that the program would positively affect participants' pain interference, physical function, pain intensity, pain behavior, mood, sleep, and pain medication usage.
Methods: Survey measurements were conducted 10 weeks before class start, immediately before the first class, and immediately after the last class.
Conclusions: Although there is a strong body of research supporting the benefits of yoga for chronic pain conditions, our experience highlights some of the challenges of implementing an adaptive yoga program. Our study found that recruitment of patient through physician referral was highly feasible; however, retention rates for participants were very low. Program adherence is a barrier for research on yoga in chronic pain, as well as for clinical practice. A slight reduction in pain interference and physical function over time and trend toward improvement in all exploratory outcomes was identified. None of these trends were statistically significant, likely because of small sample size.
© 2019 American Society for Pain Management Nursing. Published by Elsevier Inc. All rights reserved.

It has been estimated that more than 30% of the U.S. population suffers from some form of chronic pain (Johannes, Johnson, & Dworkin, 2010). Pain is one of the most common reasons people visit a physician with an estimated annual cost of more than $600 billion (more than cancer, heart disease, and diabetes) (Gaskin & Richard, 2012). Chronic low back pain accounts for around 27% of chronic pain cases in the United States, and chronic neck pain is estimated to account for around 14% (Pleis & Lethbridge-Cejku, 2007). Fibromyalgia, another cause of chronic pain, affects nearly 5 million Americans (Lawrence et al., 2008). In the United States, it is estimated that 1 in 5 individuals with noncancer pain or other pain diagnoses are being prescribed opioids (Daubresse et al.,

2013). As the opioid epidemic reaches new heights, clinicians are searching for alternative pain management treatment options, such as yoga, tai chi, qigong, or acupuncture.

Multiple meta-analyses of yoga interventions for pain have found that yoga can be a beneficial intervention for multiple pain disorders and that even short-term yoga use may be effective in reducing pain (Büssing, Ostermann, Lüdtke, & Michalsen, 2012; Ward, Stebbings, Cherkin, & Baxter, 2013). People diagnosed with chronic pain who engaged in a weekly yoga program for 8 weeks, as well as practiced yoga at home, reported less frequency and intensity of pain episodes (Tul, Unruh, & Dick, 2011). The researchers hypothesized that the decrease in pain resulted from the patients' increased ability to control pain interference through awareness of their bodies. In another study, participants diagnosed with chronic pain who took part in yoga, in addition to conventional occupational therapy, had more significant decreases in disability as well as increases in social

Address correspondence to Sara F. Hall, MS, APRN-BC, CNS, Pain Management Department, Regions Hospital, 640 Jackson St., Mail Stop 11102U, St. Paul, MN 55101.
E-mail address: Sara.F.Hall@HealthPartners.com (S.F. Hall).

life than those patients who took part in conventional occupational therapy alone (Wattamwar & Nadkarni, 2012).

For low back pain, various studies have found that yoga interventions can be more effective than other interventions at decreasing pain (Saper et al., 2009; Williams et al., 2005). Individuals with chronic low back pain who participated in yoga classes were found to have significant reductions in pain medication usage, pain intensity, and functional disability compared with a control group that did not participate in yoga (Williams et al., 2005). In a predominantly minority population, a yoga intervention was suggested to be more effective for reducing pain and pain medication use than usual care (Saper et al., 2009). Furthermore, individuals who participated in a yoga intervention reported not only reduced pain and disability but also reduced depression compared with controls (Williams et al., 2009). These results, among others, indicate that yoga may reduce pain symptoms and disability as well as reduce pain medication usage and depression in individuals with chronic low back pain.

There are far fewer studies on yoga in individuals with chronic neck pain and fibromyalgia. A 9-week yoga intervention in participants diagnosed with chronic neck pain decreased patients' neck-related disability and pain for at least 12 months (Cramer, Lauche, Hohmann, Langhorst, & Dobos, 2013b). In another study, participants with chronic neck pain who attended weekly 90-minute yoga sessions for nine weeks had increased coping ability, decreased pain levels, and increased pain acceptance (Cramer et al., 2013a). Individuals with fibromyalgia who participated in yoga had decreased pain and fatigue and improved mood, vigor, and acceptance in comparison with a control group (Carson et al., 2010).

Engaging in community yoga programs can be difficult for patients with chronic pain. Anxiety, depression, sleep disturbances, and a host of other comorbidities that accompany chronic pain can make embarking on a yoga practice more challenging (De Roa, Paris, Poindessous, Maillet, & Hèron, 2018). In addition, these patients often have maladaptive health behaviors such as an aversion to exercise because of past experiences when physical therapy may have flared their pain (Edwards, Dworkin, Sullivan, Ruck, & Wasan, 2016). By learning yoga, individuals with chronic pain can learn relaxation techniques and body awareness that they can use for future stressors (Cramer et al., 2013a; Tul et al., 2011). In addition, most other yoga studies did not include a yoga instructor with a vast knowledge of chronic pain. Yoga adapted for patients' specific needs could serve as a bridge to participation in community programs.

In this study we explored the feasibility of implementing an adaptive yoga intervention, developed specifically for participants diagnosed with chronic pain, taught by a pain management certified nurse, in a large Midwest neuroscience pain clinic. Unique qualities of the study design included a pragmatic, wide clinical population of generalized participants diagnosed with chronic pain and patient-centered outcomes (pain interference and physical function). Although small, this study is unique in exploring the effect of yoga on pain intensity, pain behavior, mood, sleep, and pain medication usage.

Methods

Study Setting and Design

A convenience sample of participants was recruited from (removed from blinded copy) Clinic in (removed from blinded copy). All study visits and yoga classes were conducted at the (removed from blinded copy), which houses the Pain Management Clinic. Participants signed informed consent forms approved by the local Institutional Review Board before any survey measures were administered or classes were attended.

This feasibility study was prospective and enrolled a total of 33 participants. Three separate classes (each with 11 participants) were held once per week for 10 weeks. Participants received this intervention at no cost and were given a yoga starter kit including a yoga mat, yoga blanket, and carrying bag. Measurements were conducted via survey at three time points: approximately 10 weeks before the start of classes (baseline), immediately before the first class (pre-intervention), and immediately after the last class (postintervention). Participants were given a $25 store gift card on completion of each of the surveys.

Study Participants

An a priori power calculation was conducted based on the primary intention of the study: to assess the feasibility of conducting yoga classes for participants diagnosed with chronic pain. With 33 participants, we could estimate a rate of attendance at the first yoga class of 75% to within a 95% confidence interval of ±14.8%. For pain interference scores, the sample size had 57% power to test the effect of pain location if the true effect size was 0.53 and 100% power to test the effect of time if the actual effect size was 2.09. The design achieved 49% power to test the effect of pain location on physical function scores if the true effect size was 0.48 and 100% power to test the effect of time on physical function scores if the true effect size was 3.49. Given the low study completion rate and number of missing postintervention measures, we modified our original analysis plan to remove all inferential tests.

Participants were recruited by pain management physician referrals via the health system's electronic health record. Potential participants were screened for inclusion and exclusion criteria before being consented and enrolled in the study. Inclusion criteria included diagnosis of chronic pain, pain clinician recommendation, willingness to participate in weekly yoga classes, English speaking, and age older than 18 years. Exclusion criteria included current enrollment in other yoga course, pregnancy, spinal cord stimulator placement, surgery within the last 6 months, and elective surgery scheduled in the following 6 months.

Participants (n = 33) were divided into three classes of equal size (n = 11 each). Although most participants had multiple chronic pain diagnoses, they were placed in a class based on an area of largest concern, either (1) chronic low back/neck/spine pain, (2) fibromyalgia/widespread chronic pain, or (3) other chronic pain (knee, wrist, shoulder, hip, etc.).

Class Intervention Protocol

The adaptive yoga curriculum used in the classes was developed by a pain management advanced practice nurse with 200 hours of yoga teacher training. In addition, to ensure safety and individualized care, a 200-hour yoga teacher trained physical therapy aide was also available during yoga classes to provide individual assistance or modification of poses as needed.

All three classes received the same yoga curriculum consisting of meditation and mindfulness training, yoga didactics, breathing exercises, and yoga poses specifically adapted for participants diagnosed with chronic pain. Specifically, if participants were unsteady or had trouble getting onto the floor, poses were modified to use chairs for safety and stability. Throughout each class, participants were encouraged to move slowly and mindfully, not pushing past their threshold of resistance. These adaptive techniques allowed participants to develop more body awareness. Moving dynamically into and out of poses allowed participants to connect their bodies with their breath and tolerate the activity in a broken down fashion. After each class, educational materials were posted on a secure website and physical copies were distributed to

participants. These reference materials were created to combat impaired concentration that can often accompany chronic pain because of higher levels of fatigue and sleep disturbances (Edwards et al., 2016). Participants were asked to practice yoga at home and incorporate techniques from classes into their daily routine over the course of our study.

Statistical Methods

Preliminary Analysis

Study participants were described by demographic characteristics, physical measurements, characteristics of pain, and previous history of yoga practice using appropriate summary measures. Because of the relatively large number of participants who did not complete the postintervention survey, we also compared these measures by completion status to determine if certain subgroups of people were more likely to adhere to the class schedule. All statistical analyses were conducted in SAS Version 9.4 using a 0.05 level of confidence.

Analysis of Feasibility Outcomes

Feasibility of implementing the yoga program for participants diagnosed with chronic pain was assessed by calculating the binomial proportion of patients who met each of the following criteria: (1) were contacted, (2) scheduled and attended a screening visit, (3) passed screening for study inclusion, and (4) ultimately signed the informed consent. We also summarized attendance at yoga classes, patient satisfaction with pain treatment (Jensen, 2011), global impression of change (Jensen, 2011), and likelihood of continuing yoga practice after class.

Analysis of Efficacy Outcomes

The primary efficacy outcomes were pain interference and physical function. Pain interference was quantified using the Modified Pain Interference Subscale of the Brief Pain Inventory (Cleeland, 1998) in which values range from 0 to 10 (0-4 indicates mild interference, 5-6 indicates moderate interference, and 7-10 indicates severe interference). This scale has been found to have excellent validity within populations with chronic noncancer pain (Keller et al., 2004; Tan, Jensen, Thornby, & Shanti, 2004). The Patient-Reported Outcomes Measurement Information System (PROMIS) Physical Function 8-Item Short Form (Cella et al., 2010) was used to assess physical function. These scores were converted to t scores to allow for a more standardized interpretation. Again, this has been found to be a highly reliable test in the chronic pain population (Cook et al., 2016).

Exploratory outcomes include the effect of yoga on pain intensity, pain behavior, mood, sleep, and pain medication usage. These outcomes were assessed, respectively, using the following validated scales: a standard Numeric Rating Scale, the PROMIS Pain Behavior Short Form with standardized t scores (Cella et al., 2010), the Patient Health Questionnaire 4 (Kroenke, Spitzer, Williams, & Lowe, 2009), the Medical Outcomes Study Sleep Problem Index II (Hays, Martin, Sesti, & Spritzer, 2005), and self-reported opioid and nonopioid use.

Our study was initially powered to test for a statistical change in the primary outcomes using a repeated-measures analysis of variance; however, given the small number of study participants at the postintervention time point and the necessity of complete data for an analysis of variance, we simply summarized all primary and exploratory measures descriptively. Summary measures were reported at baseline, pre-intervention, and postintervention within all study participants and, as a sensitivity analysis, within only those participants who completed all three surveys. Baseline measurements were taken during the screening visit to account for

the large amount of variation between participants. Chronic pain is a very broad condition so by allowing participants to serve as their own control, we were able to account for some variability in the disorder.

Results

Description of Study Population

Among the 33 participants who completed the baseline assessment, 25 (75.8%) had a low back, neck, or spine diagnosis; 17 (51.5%) had fibromyalgia or widespread pain; and 18 (54.5%) had another pain diagnosis (Fig. 1A). Twenty (60.6%) had two or more of these diagnoses (Fig. 1B). One third of participants were retained overall; however, a higher proportion (80%) of participants with multiple pain diagnoses withdrew or were lost to follow-up before study completion. The participants who withdrew or were lost to follow up were contacted three times in effort to better understand reasons why they stopped, however, none of them were able to be reached.

Participants were, on average (Table 1), 51.4 ± 11.3 years old, mostly female (75.8%), white (81.8%), and non-Hispanic (93.9%). The average height was 65.6 ± 3.7 inches, weight was 185.9 ± 39.2 pounds, and body mass index was 30.3 ± 5.3. Nearly all participants (93.9%) had little to no previous yoga experience because we excluded participants with extensive experience. There was a wide range in the number of years that had passed since the participants' first chronic pain diagnosis. All these characteristics were similar between participants who completed the study and those who were lost to follow-up or withdrew early. One characteristic that differed between groups was disability status, with all 10 participants who were on disability at the beginning of the study failing to complete the final visit ($p = .013$). Pain interference scores were similar between groups with an average score of 5.2 ± 2.1; however, the completers had higher physical function scores indicating greater physical ability at the beginning of the study (37.8 ± 3.8 vs. 34.9 ± 3.6, $p = .041$).

Feasibility Results

From physician referrals over a 1-month period, we received contact information for 83 patients (Table 2). Fifty-one of the contacted patients (61.4%) were screened and 33 of the screened patients (64.7%) met criteria for study inclusion. All participants who screened positive agreed to participate in the study and signed the informed consent. Ultimately, 11 participants completed the full study, including all surveys; 13 participants withdrew before study completion, and 9 participants were lost to follow-up. Study participants attended, on average, 4.3 ± 3.8 of the 10 yoga classes. Three participants attended all 10 yoga classes, and six withdrew or were lost to follow-up before the first class.

Among the participants who completed the study, satisfaction with pain treatment and global impression of change was very optimistic. Seven participants (63.6%) reported feeling "a little better" and three (27.3%) reported feeling "better" at the end of the study. On a scale of 1-10, participants said their likelihood of continuing yoga after the class was, on average, 8.5 ± 1.7.

Efficacy Results

We identified a reduction in average pain interference (from 5.2 ± 2.1 to 3.7 ± 2.3) and an improvement in physical function scores (from 35.9 ± 3.9 to 38.3 ± 4.5); however, these changes were not statistically significant (Table 3, Fig. 2). This likely is due to the small sample size at the postintervention time point. We also saw
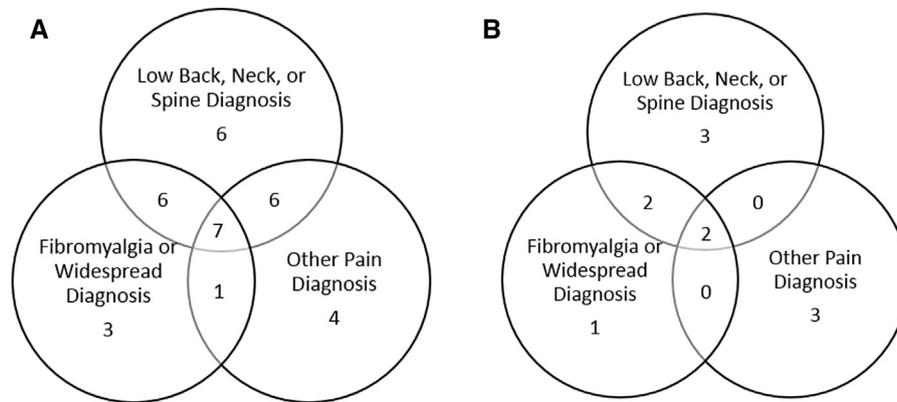
Figure 1. Distribution of pain diagnoses reported by study participants at A) baseline (N = 33) and B) at completion of intervention (N = 11).

trends toward improvement in all exploratory outcomes (Table 3). At baseline, 36.4% of participants reported opioid use and 81.8% reported nonopioid use. By the postintervention time point, these numbers dropped to 18.2% and 54.5%, respectively. As shown in Table 4, these trends were also present within the population of 11 participants who completed the study, though slightly less pronounced. Average pain interference was reduced from 4.4 ± 1.9 at baseline to 3.7 ± 2.3 after intervention.

Discussion

Although there is a strong body of literature supporting the benefits of yoga for chronic pain conditions such as low back pain, our experience highlights some of the challenges of implementing a program in this patient population. As indicated by the high number of physician referrals for the yoga intervention and the large number of participants screened, the recruitment of participants through a large Midwest pain clinic was not only feasible but also easily accomplished for a study of this size. In contrast, the retention rate for participants was much lower than anticipated. The lost to follow-up and withdrawal rates are most likely a result of a number of factors, including patients' hectic schedules, lack of financial commitment to program, hesitation about physical ability to participate, and the season (summer) in which the intervention took place. However, satisfaction with pain treatment and global impression of change

Table 1
Study Participant Demographic Characteristics at Baseline

Characteristic	Total (N = 33)	Completed Study (N = 11)	Lost to Follow-up (N = 22)	p
Age	51.4 ± 11.3	54.3 ± 12.4	50.0 ± 10.7	.308[*]
Sex				.392[†]
Male	8 (24.2%)	4 (36.4%)	4 (18.2%)	
Female	25 (75.8%)	7 (63.6%)	18 (81.8%)	
Race				.729[†]
White	27 (81.8%)	11 (100%)	16 (72.7%)	
African American	1 (3.0%)	0 (0%)	1 (4.6%)	
Asian	1 (3.0%)	0 (0%)	1 (4.6%)	
Multiple races	2 (6.1%)	0 (0%)	2 (9.1%)	
Other	2 (6.1%)	0 (0%)	2 (9.1%)	
Ethnicity				.542[†]
Hispanic/Latino	2 (6.1%)	0 (0%)	2 (9.1%)	
Not Hispanic/Latino	31 (93.9%)	11 (100%)	20 (90.9%)	
Height (inches)	65.6 (3.7)	66.8 (3.5)	65.0 (3.7)	.186[*]
Weight (pounds)	185.9 (39.2)	187.5 (43.6)	185.0 (37.9)	.866[*]
BMI	30.3 (5.3)	29.3 (5.2)	30.8 (5.4)	.475[*]
Yoga experience				.740
None	16 (48.5%)	5 (45.5%)	11 (50.0%)	
A little	15 (45.4%)	6 (54.6%)	9 (40.9%)	
Moderate	2 (6.1%)	0 (0%)	2 (9.1%)	
Disability				**.013**[†]
Yes	10 (30.3%)	0 (0%)	10 (45.5%)	
No	23 (69.7%)	11 (100%)	12 (54.6%)	
Years since pain diagnosis				.881[†]
Less than 5 years	8 (24.2%)	4 (36.4%)	4 (18.2%)	
5-10 years	10 (30.3%)	3 (27.3%)	7 (31.8%)	
10-20 years	11 (33.3%)	3 (27.3%)	8 (36.4%)	
More than 20 years	3 (9.1%)	1 (9.1%)	2 (9.1%)	
Unknown year of diagnosis	1 (3.0%)	0 (0%)	1 (4.5%)	
Brief Pain Interference Score	5.2 ± 2.1	4.4 ± 1.9	5.6 ± 2.1	.151[*]
PROMIS Physical Function Standardized Score	35.9 ± 3.9	37.8 ± 3.8	34.9 ± 3.6	**.041**[*]

BMI = body mass index; PROMIS = Patient-Reported Outcomes Measurement Information System; SD = standard deviation.
Values listed as mean ± SD or n (%).
Statistically significant between-group differences (p < .05) are given in bold.
[*] Equal variance t test.
[†] Fisher's exact test.

Table 2
Summary of Feasibility Outcomes

Feasibility Outcome	
Enrollment process	
No. of participants contacted	83
No. who scheduled and attended screening visit	51 (61.4%)
No. who passed screening for study inclusion	33 (64.7%)
No. who signed informed consent	33 (100%)
Class participation	
Average number of classes attended	4.3
Number who attended all 10 classes	3
Reflection on program (N = 11)	
Satisfaction with pain treatment	
Satisfied	1 (9.1%)
Very satisfied	10 (90.9%)
Global impression of change	
No change	1 (9.1%)
A little better	7 (63.6%)
Better	3 (27.3%)
Adoption of yoga practice	
Likelihood of continuing yoga after class (0-10 scale)	8.5 ± 1.7

Values listed as mean ± standard deviation or n (%).

by those participants who did complete the study were promising. Future studies should include ways to capture reasons for withdrawal, perhaps at follow-up pain clinic appointments or through e-mail surveys.

Program adherence is a barrier for research on yoga in chronic pain, as well as for clinical practice. No significant differences in pain interference and physical function over time was identified in this study, most likely as a result of small sample size because of lack of adherence strategies and low incentives. However, a slight improvement was found in both pain interference and physical function scores as well as a trend toward improvement in all exploratory outcomes in the postintervention survey. The adherence results are similar to previous reports of participants diagnosed with chronic pain in physical activity and exercise interventions that found poor compliance and low retention rates compared with control groups (Geneen et al., 2017). Specific to yoga, a prior study reported that strong barriers to practice included an irregular lifestyle, family commitments, and occupational commitments (Dayananda, Ilavarasu, Rajesh, & Babu, 2014). Another study found that employment outside the home was a strong indicator of class attendance (Cadmus-Bertram et al., 2013).

Additionally, we noted that participants taking opioids and/or on disability dropped out early in our study, which could be due to several different reasons. One possible reason was that those on disability might lose benefits if overall well-being and physical function improve. Additionally, individuals taking opioid medications might want to remain taking them for a variety of reasons. Opioids may also interfere with adoption of a yoga practice, making people feel disconnected to their bodies. Creative payment and incentive programs may increase consistent participation. A follow-up questionnaire 3 months after the completion of the program might also be useful in detecting more long-term changes and potential benefits.

There is a strong need for adapted yoga programs for people diagnosed with chronic pain. Although there is an increase in a variety of yoga class offerings at community studios and fitness centers, the classes are often geared toward youth and are fitness based for toning muscles. These may not be appropriate for people diagnosed with chronic pain as a result of being too advanced, causing participants to compare with others who may be more flexible. They may also contain more Sanskrit language, which may intimidate new students. Many people diagnosed with chronic pain do not feel they can participate in traditional yoga classes at a fitness center or community-based yoga program because of concerns regarding their physical ability, lack of confidence, or fear of increased pain during and after class. Styles of yoga classes can vary greatly, and finding the right amount of instruction or guidance or support can be challenging. Additionally, traditional yoga training does not educate instructors about the science of diseases and aging or how to best address patients with complex chronic pain. Connecting to the body through yoga may cause anxiety or trigger post-traumatic stress related to particular areas of the body, both of which are common in participants diagnosed with chronic pain. By having our classes lead by a certified pain management nurse who understands the impact chronic pain can have on patients, the yoga classes were individualized and patients experienced a sense of comfort with the instructors. As Western medical practitioners recommend yoga to more patients diagnosed with chronic pain because of the increase in literature supporting its benefits, few providers have a good understanding of who would best benefit and what type of yoga to recommend. There are increased numbers of yoga classes offered in a wide variety of settings with various levels of trained instructors. The availability of specialized

Table 3
Summary of Primary and Exploratory Outcomes among All Study Participants

	Baseline (N = 33)	Preintervention (N = 27)	Postintervention (N = 11)
Primary Outcomes			
BPI Pain Interference Subscale	5.2 ± 2.1	4.9 ± 1.8	3.7 ± 2.3
BPI Pain Interference Subscale			
Mild interference (0-4)	11 (33.3%)	9 (33.3%)	7 (63.6%)
Moderate interference (5-6)	10 (30.3%)	9 (33.3%)	1 (9.1%)
Severe interference (7-10)	12 (36.4%)	9 (33.3%)	3 (27.3%)
PROMIS Physical Function Standardized score	35.9 ± 3.9	36.1 ± 4.4	38.3 ± 4.5
Secondary outcomes			
Pain intensity (0-10 scale)	6.1 ± 1.9	5.7 ± 1.9	4.3 ± 2.1
Pain medication usage			
Opioids	12 (36.4%)	10 (37.0%)	2 (18.2%)
Nonopioids	27 (81.8%)	21 (77.8%)	6 (54.5%)
PHQ-4 Total	4.9 ± 3.8	5.0 ± 3.4	3.5 ± 1.9
Anxiety score	2.5 ± 2.0	2.7 ± 1.9	1.8 ± 1.1
Depression score	2.4 ± 2.0	2.3 ± 1.7	1.7 ± 1.3
PROMIS Pain Behavior	61.4 ± 2.9	60.8 ± 2.0	59.4 ± 2.6
SPI II (Sleep)	50.9 ± 21.3	49.4 ± 20.5	37.9 ± 23.1

BPI = Brief Pain Inventory; PROMIS = Patient-Reported Outcomes Measurement Information System; PHQ = Patient Health Questionnaire; SPI = Sleep Problem Index; SD = standard deviation.
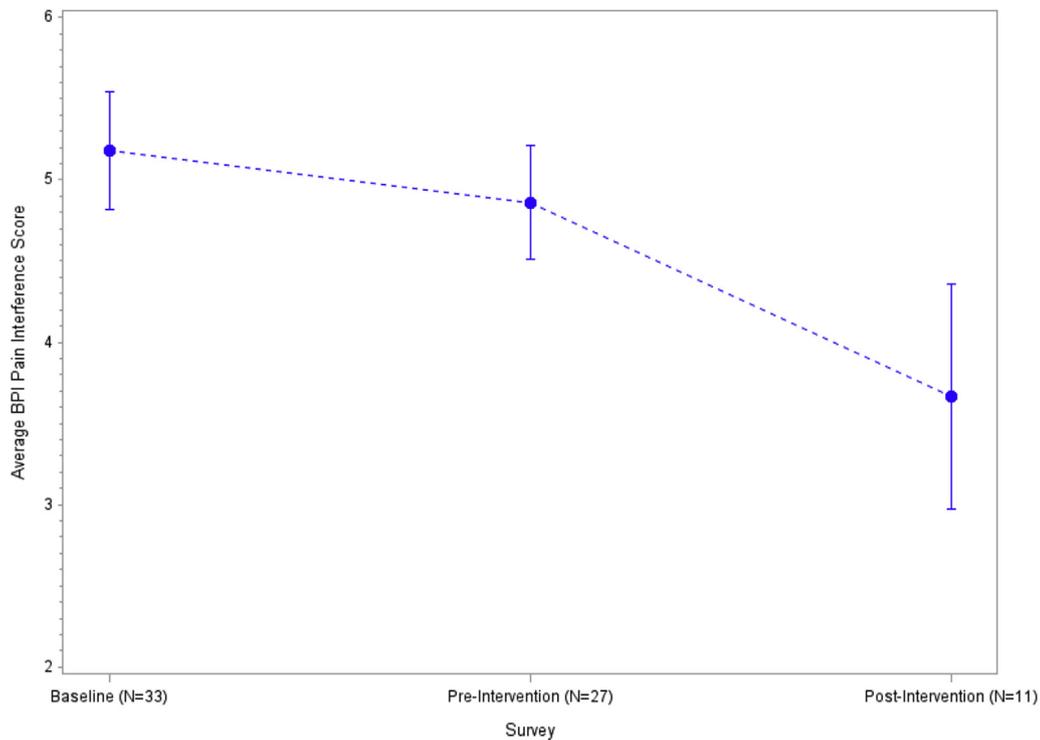Values listed as mean ± SD or n (%).

Figure 2. Change in average BPI Pain Interference score over.

instructors as well as education for health care providers on available resources are keys to ameliorating this situation. Leading participants in a guided low-intensity yoga experience with an instructor who specializes in chronic pain management allows individuals diagnosed with chronic pain to participate in a safe and potentially beneficial experience.

Practicing yoga in a group setting as opposed to individual sessions, as done with massage, acupuncture, or physical therapy, can improve affordability. Additionally, a group setting offers an opportunity to build relationships and foster social networking to help reduce isolation often felt by people suffering from chronic pain. Social support and its benefits for individuals living with chronic pain have been found to have a positive impact (Taylor

et al., 2016). Nurses are ideal for leading yoga classes because of their focus on the psychosocial impact of chronic pain and ability to see patients from a global perspective. By offering the yoga classes at the clinic building, our patients had a convenient location and knowledgeable instructors to lead them in a safe, modified practice. Having participants start their yoga practice in this type of setting can build their skills set and confidence to be able to attend gentle yoga classes in the community. Anecdotally, many participants commented on how beneficial it was to be taught diaphragmatic breathing. They noted benefit from this, likely because of the breathing technique shifting them into a parasympathetic state. In addition to this, participants reported great benefits from a titration of gentle poses with a focus on recognizing their individual abilities

Table 4
Summary of Primary and Exploratory Outcomes among Participants Who Completed Post-intervention Survey

	Baseline (N = 11)	Preintervention (N = 11)	Postintervention (N = 11)
Primary Outcomes			
BPI Pain Interference Subscale	4.4 ± 1.9	4.2 ± 1.4	3.7 ± 2.3
BPI Pain Interference Subscale			
Mild interference (0-4)	4 (36.4%)	6 (54.6%)	7 (63.6%)
Moderate interference (5-6)	4 (36.4%)	4 (36.4%)	1 (9.1%)
Severe interference (7-10)	3 (27.3%)	1 (9.1%)	3 (27.3%)
PROMIS Physical Function Standardized score	37.8 ± 3.8	37.9 ± 4.0	36.3 ± 4.5
Secondary outcomes			
Pain intensity (0-10 scale)	5.1 ± 1.7	4.8 ± 1.6	4.3 ± 2.1
Pain medication usage			
Opioids	2 (18.2%)	2 (18.2%)	2 (18.2%)
Nonopioids	8 (72.7%)	8 (72.7%)	6 (54.5%)
PHQ-4 total	3.7 ± 3.0	4.6 ± 3.0	3.5 ± 1.9
Anxiety score	1.6 ± 1.4	2.6 ± 1.7	1.8 ± 1.1
Depression score	2.1 ± 1.8	2.0 ± 1.7	1.7 ± 1.3
PROMIS Pain Behavior	60.1 ± 2.7	60.0 ± 1.6	59.4 ± 2.6
SPI II (Sleep)	36.1 ± 16.0	42.7 ± 18.9	37.9 ± 23.1

BPI = Brief Pain Inventory; PROMIS = Patient-Reported Outcomes Measurement Information System; PHQ = Patient Health Questionnaire; SPI = Sleep Problem Index; SD = standard deviation.
Values listed as mean ± SD or n (%).

and limitations with modifications of traditional poses. The titration of gentle poses coupled with the additional modifications allowed participants to build their confidence, strength, balance, and skill level. Once participants completed the 10 weeks with our program, they were more prepared to attend yoga classes in the community.

Limitations of this study include small sample size and high attrition. Despite multiple attempts to contact participants who dropped out, we were unable to ascertain reasons for their discontinuance. This resulted not only in less information about feasibility of the study, but also the inability to conduct planned statistical analyses on our primary efficacy outcomes. Additionally, the study population consisted of primarily white, non-Hispanic women. The feasibility of this program among patients with different demographics cannot be determined from the results of this study. The study did not contain a control group and, instead, participants served as their own control. Finally, we relied on self-reported data for pain medication usage. This resulted in relatively inconsistent reporting and made it challenging to draw conclusions about the effect of our yoga program on medication usage.

Incorporating more nurse-led, nonpharmacologic methods of pain control, like yoga, into pain management programs, can increase active self-care and mind-body awareness to improve overall health. With regular practice, we hope that yoga can be an alternative to opioid medications and lead to reduced health care utilization. Based on these results, next steps would be to focus on enhanced participation and capture reasons for drop out more consistently.

Acknowledgments

References

Büssing, A., Ostermann, T., Lüdtke, R., & Michalsen, A. (2012). Effects of yoga interventions on pain and pain-associated disability: A meta-analysis. *The Journal of Pain, 13*(1), 1—9.

Cadmus-Bertram, L., Littman, A. J., Ulrich, C. M., Stovall, R., Ceballos, R. M., McGregor, B. A., Wang, C. Y., Ramaprasad, J., & McTiernan, A. (2013). Predictors of Adherence to a 26-week viniyoga intervention among post-treatment breast cancer survivors. *The Journal of Alternative and Complementary Medicine, 19*(9), 751—758.

Carson, J. W., Carson, K. M., Jones, K. D., Bennett, R. M., Wright, C. L., & Mist, S. D. (2010). A pilot randomized controlled trial of the Yoga of Awareness program in the management of fibromyalgia. *Pain, 151*(2), 530—539.

Cook, K., Jensen, S., Schalet, B., Beaumont, J., Amtmann, D., Czajkowski, S., Dewalt, D. A., Fries, J. F., Pilkonis, P. A., Reeve, B. B., Stone, A. A., Weinfurt, K. P., & Cella, D. (2016). PROMIS measures of pain, fatigue, negative affect, physical function, and social function demonstrated clinical validity across a range of chronic conditions. *Journal of Clinical Epidemiology, 73*, 89—102.

Cella, D., Riley, W., Stone, A., Rothrock, N., Reeve, B., Yount, S., Amtmann, D., Bode, R., Buysse, D., Choi, S., Cook, K., DeVellis, R., DeWalt, D., Fries, J. F., Gershon, R., Hahn, E. A., Lai, J. S., Pilkonis, P., Revicki, D., Rose, M., Weinfurt, K., Hays, R., & PROMIS Cooperative Group. (2010). The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult self-reported health outcome item banks: 2005-2008. *Journal of Clinical Epidemiology, 63*(11), 1179—1194.

Cleeland, C. S. (1998). The Brief Pain Inventory User Guide. Retrieved from https://www.manualslib.com/manual/553/Charles-S-Cleeland-The-Brief-Pain-Inventory-Ii.html?page=1#manual.

Cramer, H., Lauche, R., Heidemarie, H., Langhorst, J., Dobos, G., & Berger, B. (2013a). "I'm more in Balance": A qualitative study of yoga for patients with chronic neck pain. *The Journal of Alternative and Complementary Medicine, 19*(6), 536—542.

Cramer, H., Lauche, R., Hohmann, C., Langhorst, J., & Dobos, G. (2013b). Yoga for chronic neck pain: A 12-month follow-up. *Pain Medicine, 14*, 541—548.

Daubresse, M., Chang, H., Yu, Y., Viswanathan, S., Shah, N. D., Stafford, R. S., Kruszewski, S. P., & Alexander, G. C. (2013). Ambulatory diagnosis and treatment of non-malignant pain in the United States, 2000-2010. *Medical Care, 51*(10), 870—878.

Dayananda, H. V., Ilavarasu, J. V., Rajesh, S. K., & Babu, N. (2014). Barriers in the path of yoga practice: An online survey. *International Journal of Yoga, 7*(1), 66—71.

De Roa, P., Paris, P., Poindessous, J. L., Maillet, O., & Hèron, A. (2018). Participantive experiences and sensitivities in women with fibromyalgia: A quantitative and comparative study. *Pain Research and Management, 2018*, 8269564.

Edwards, R. R., Dworkin, R. H., Sullivan, M. D., Turk, D., & Wasan, A. D. (2016). The role of psychosocial processes in the development and maintenance of chronic pain disorders. *The Journal of Pain, 17*(9 suppl), T70—T92.

Gaskin, D. J., & Richard, P. (2012). The economic costs of pain in the United States. *The Journal of Pain, 13*(8), 715—724.

Geneen, L. J., Moore, R. A., Clarke, C., Martin, D., Colvin, L. A., & Smith, B. H. (2017). Physical activity and exercise for chronic pain in adults: An overview of Cochrane Reviews. *The Cochrane Database of Systematic Reviews,* (4), CD011279.

Hays, R., Martin, S., Sesti, A., & Spritzer, K. (2005). Psychometric properties of the medical outcomes study sleep measure. *Sleep Medicine, 6*(1), 41—44.

Jensen, M. (2011). *The pain stethoscope: A clinician's guide to measuring pain.* Tarporley, UK: Springer Healthcare.

Johannes, C. C., Le, T. K., Johnson, J. A., & Dworkin, R. H. (2010). The prevalence of chronic pain in United States adults: Results of an Internet-based survey. *The Journal of Pain, 11*(11), 1230—1239.

Keller, S., Bann, C. M., Dodd, S. L., Schein, J., Mendoza, T. R., & Cleeland, C. S. (2004). Validity of the brief pain inventory for use in documenting the outcomes of patients with noncancer pain. *The Clinical Journal of Pain, 20*(5), 309—318.

Kroenke, K., Spitzer, R., Williams, J. W., & Lowe, B. (2009). An ultra-brief screening scale for anxiety and depression: The PHQ-4. *Psychosomatics, 50*, 613—621.

Lawrence, R. C., Felson, D. T., Helmick, C. G., Arnold, L. M., Choi, H., Deyo, R. A., Gabriel, S., Hirsch, R., Hochberg, M. C., Hunder, G. G., Jordan, J. M., Katz, J. N., Kremers, H. M., Wolfe, F., & National Arthritis Data Workgroup. (2008). Estimates of the prevalence of arthritis and other rheumatic conditions in the United States: Part II. *Arthritis and Rheumatism, 58*(1), 26—35.

Pleis, J. R., & Lethbridge-Cejku, M. (2007). Summary health statistics for U.S. adults: National Health Interview Survey, 2006. National Center for Health Statistics. *Vital and Health Statistics, 10*(235), 1—153.

Saper, R. B., Sherman, K. J., Cullum-Dugan, D., Davis, R. B., Phillips, R. S., & Culpepper, L. (2009). Yoga for chronic low back pain in a predominantly minority population: A pilot randomized controlled trial. *Alternative Therapies in Health and Medicine, 15*(6), 18—27.

Tan, G., Jensen, M., Thornby, J., & Shanti, B. (2004). Validation of the Brief Pain Inventory for chronic nonmalignant pain. *The Journal of Pain, 5*(2), 133—137.

Taylor, A. M., Phillips, K., Patel, K. V., Turk, D. C., Dworkin, R. H., Beaton, D., Clauw, D. J., Gignac, M. A. M., Markman, J. D., Williams, D. A., Bujanover, S., Burke, L. B., Carr, D. B., Choy, E. H., Conaghan, P. G., Cowan, P., Farrar, J. T., Freeman, R., Gewandter, J., Gilron, I., Goli, V., Gover, T. D., Haddox, J. D., Kerns, R. D., Kopecky, E. A., Lee, D. A., Malamut, R., Mease, P., Rappaport, B. A., Simon, L. S., Singh, J. A., Smith, S. M., Strand, V., Tugwell, P., Vanhove, G. F., Veasley, C., Walco, G. A., Wasan, A. D., & Witter, J. (2016). Assessment of physical function and participation in chronic pain clinical trials: IMMPACT/OMERACT recommendations. *Pain, 157*(9), 1836—1850.

Tul, Y., Unruh, A., & Dick, B. D. (2011). Yoga for chronic pain management: A qualitative exploration. *Scandinavian Journal of Caring Sciences, 25*, 435—443.

Ward, L., Stebbings, S., Cherkin, D., & Baxter, G. D. (2013). Yoga for functional ability, pain, and psychosocial outcomes in musculoskeletal conditions: A systematic review and meta-analysis. *Musculoskeletal Care, 11*, 203—217.

Wattamwar, R. B., & Nadkarni, K. (2012). Effect of conventional occupational therapy and yoga in chronic low back pain. *The Indian Journal of Occupational Therapy, 44*(2), 13—20.

Williams, K., Abildso, C., Steinberg, L., Doyle, E., Epstein, B., Smith, D., Hobbs, G., Gross, R., Kelley, G., & Cooper, L. (2009). Evaluation of the effectiveness and efficacy of Iyengar yoga therapy on chronic low back pain. *Spine, 34*(19), 2066—2076.

Williams, K. A., Petronis, J., Smith, D., Goodrich, D., Wu, J., Ravi, N., Doyle, E. J., Juckett, R. G., Kolar, M. M., Gross, R., & Steinberg, L. (2005). Effect of Iyengar yoga therapy for chronic low back pain. *Pain, 115*(1-2), 107—117.