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The impact of yoga in medically underserved populations: A mixed-methods study

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ABSTRACT

Objectives: We evaluated the acceptability, access, and impact of yoga among participants in yoga classes co-located in community health centers.
Design: Participants were invited to complete a mixed-methods program evaluation consisting of a pre/post survey at their first class and structured interviews at 4 months.
Setting: The study took place at two community health centers on the South Side of Chicago, IL, USA.
Interventions: Four weekly 1–1.5 hour yoga classes were provided by four certified yoga instructors trained to teach to all ability levels.
Measures: Our primary outcome measures were pain and stress before and after the first class, and at 4-months. We gathered data about participant demographics, their health problems, how they accessed the classes, and motivations and barriers to attending. We also extracted themes from participants' qualitative feedback about their experiences.
Results: Overall, 70 participants completed the initial surveys; 44 completed the 4-month interviews. A racially and ethnically diverse group of middle- and low-income adult patients and community members attended, with flyers and word of mouth the major routes to the class. A single yoga class provided statistically significant decreases in pain and stress, but these benefits were not demonstrated at the 4-month follow-up. The primary motivators for yoga class attendance were stress relief, exercise, and overall health improvement. Primary barriers included family issues, schedule, illness, and work conflicts. Primary benefits included physical benefits, relaxation, emotional benefits, and community connectedness.
Conclusions: Co-locating yoga classes in community health centers provides a variety of benefits and is a viable pathway to addressing disparities in yoga access.

1. Introduction

Yoga is increasingly popular in the United States, as its use has grown in all age groups over a recent 10-year period, becoming (as of 2012) the most utilized mind and body practice.[1] Numerous studies have demonstrated health benefits to practicing yoga.[2] Yet, there are personal and structural barriers in community access to yoga classes in some underrepresented racial groups, including African-American women.[3] With the Community Yoga Demonstration Project (CYDP), which grew into the non-profit organization YogaCare, we sought to ensure the healing benefits of yoga were available to racially, socio-economically, and ethnically diverse populations in Chicago by co-

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locating classes in community health centers in under-resourced neighborhoods.

1.1. Yoga's application to health

Yoga has been shown to promote mental and physical health, in part due to its impact on the hypothalamic-pituitary axis that moderates cortisol release and modifies its adverse effect on cardiovascular, neuroendocrine and central nervous systems.[4] Yoga can improve pain management and decrease the stress response. Studies on yoga interventions for chronic lower back pain, the second most common reason for physician office visits,[5] have demonstrated improvement in pain levels and intensity,[6] back-related function and pain,[7] including in low-income racially diverse settings.[8–10] The American College of Physicians has developed clinical guidelines that favor self-management for low back pain; these include recommending first-line treatments of yoga, mindfulness-based stress reduction, and other techniques before resorting to pharmacological interventions.[11] The Centers for Disease Control and Prevention also includes exercise and yoga as recommended nonpharmacological treatments for chronic pain.[12]

In addition to the impact of yoga on pain management, yoga is valuable for stress management. Participants in a yoga dosing trial reported increased relaxation, improved mood, and better stress management.[13] Yoga and wellness programs for older adults have been shown to reduce stress levels and improve quality of life.[14] Yoga's benefits include but are not limited to improved stress-related autonomic measures, such as blood pressure and heart rate[15]; diabetes risk reduction through weight loss, decreased waist circumference, and lower perceived stress;[16] lower body mass index;[17] and reduced depression and decreased stress for post-menopausal women.[18]

1.2. Barriers to access & disparities

Despite the health benefits of yoga, not all populations have equal access to quality yoga instruction. Yoga utilization in the US is highest among highly educated Caucasian women with high socioeconomic status, education, and generally good health, with lower uptake among people of color with lower incomes and poor health status.[1,2] In a study investigating motivations for adopting and maintaining a yoga practice, yoga students and instructors surveyed were mostly female (94–95%), Caucasian (75%), and having attained a bachelor's degree or higher (85%).[19]

There may be different barriers to yoga for different populations. For example, people of color and those with low socioeconomic backgrounds are underrepresented in much of the published yoga research.[20] These disparities in yoga utilization may be reflective of structural inequalities that exacerbate disparities in health, and lower utilization in communities of color may be more a question of affordability and accessibility. For example, for-profit yoga studios in the US are more often located in higher-income areas that are majority Caucasian, urban or suburban, and in gentrified areas.[21,22] Since payment to yoga studios is out-of-pocket, studios often cluster in high-income rather than low-income neighborhoods. This is true particularly in Chicago, known for its geographical, racial, and class segregation.[23] At the time this study was initiated, the authors were not aware of other yoga programs in the under-resourced communities under study, though this situation has improved in intervening years.

1.3. Our study's contribution

We conducted a program evaluation of the initial year of yoga classes offered by the CYDP – which grew into the non-profit yoga service organization YogaCare – to assess the acceptability, access, and impact of yoga among underserved populations. We hope this work may add to the literature about developing yoga programs in under-resourced communities and thereby assist others in designing yoga programs that address the needs of patients and community members.

2. Materials and methods

2.1. Program overview, recruitment, and materials

The CYDP emerged from a yoga class offered in a federally qualified health center (FQHC) in the South Chicago neighborhood as a service learning project of a 500-hour registered yoga teacher (RYT), sponsored by the Chicago Area Albert Schweitzer Fellows Program. An additional grant from the Schweitzer Fellows Program and funded by the American Medical Association allowed for expansion by adding the following: one new class taught by a 200-hour certified yoga teacher (CYT) at the FQHC and two additional classes taught by two other 200-hour CYTs at a free clinic for the uninsured. A community grant from the Institute for Translational Medicine through the University of Chicago provided additional funding for program evaluation.

The four classes provided at two different health centers by four certified instructors ranged from 1 to 1.5 h. The classes were at clinics that were over 6 miles apart, and though all four classes were open to all participants during the study period, most attended classes at the clinic closest to their home. Participants could have attended up to four classes a week over the time between their first class and their follow-up survey (ranging from 91 to 267 days post their first class).

Classes emphasized gentle mindful movement (asanas) with breath work (pranayama) and meditation. Two weekly gentle yoga classes were held at the FQHC in an open atrium on Thursday evenings (1 h), and Saturday mornings (1.25 h), with both classes taught by different bilingual instructors – one Caucasian male and one Latina female. Another two weekly yoga classes were taught in English at a free clinic in a small, enclosed conference room – a pain relief-focused class co-taught by a Caucasian male and Asian-American female yoga teacher on Wednesday mornings (1.5 h), and a relaxation-focused yoga class with Reiki taught by a Latina female on Tuesday mornings (1.25 h). Three classes included asana, pranayama, and meditation, and one class included restorative yoga with Reiki and meditation. Classes were intentionally non-standardized and adapted to individual participants, per the judgment of each instructor based on students' individual presenting needs and ability levels. Instructors checked in with all students during a group check-in to start each class as a way to identify presenting ailments and needs and to build cohesion in the class.

Participants were adults who were affiliated with the FQHC and free clinic as a patient, employee, or community member, spoke English or Spanish, and were physically able to do simple yoga postures. Patients and community members were invited to attend classes using promotional fliers, physician referrals (some were written yoga prescriptions), and word of mouth. There was an incentive to receive a yoga mat if participants attended ten sessions in three months. All research materials used were developed by the research team and translated into Spanish via a committee translation method that included health center staff and study personnel.

We invited all yoga class attendees beginning in March of 2013 to participate in the program evaluation research. Rather than a cohort design, we chose to enroll participants on the date they arrived at class. The first participant was enrolled in March, the last participant was enrolled in September, and the study ended in January of 2014. Our primary outcome measures were participant pain and stress before and after the first class, and at four-month follow-up.

Participants completed self-administered pre/post surveys at their first yoga class. They characterized their current pain and stress on a 10-point Likert scale before and after the first class and again at four-months using the same question. They also completed the following study forms:

2.1.1. Consent script form

Used for participant consent.

2.1.2. Agreement and general release from liability

Required by each clinic.

2.1.3. New student information form

At the first session before class, this form collected demographic data, information on preexisting comorbidities and pain locations, how participants heard about the class, and what they were hoping for from attending yoga. Baseline self-reported pain and stress were assessed on a 10-point Likert scale (0 = No Pain, 10 = Worst Pain I've Ever Felt; 0 = No Stress, 10 = Worst Stress I've Ever Felt).

2.1.4. Yoga participant questionnaire

This posttest survey, given immediately after participants' first class, collected anticipated barriers, quality improvement measures about what they liked and didn't like, and self-reported pain and stress.

2.1.5. Yoga participant questionnaire follow-up survey

The follow-up survey was designed to be given at three-months post the participant's first class and administered through structured interviews by study personnel either by telephone or in person immediately after a yoga class. Quantitative questions assessed pain and stress levels, actual barriers to attending (a checklist of transportation, family conflicts, work conflicts,forgetting about the class, the class being too difficult, time not good, being sick, weather, safety concerns, not feeling like coming, being dissatisfied with the class, child care, and other), and home practice. Qualitative questions included feedback about the instructor, what participants liked and didn't like, successes, challenges, barriers, and hopes for future classes. Class attendance was recorded via sign-in sheets.

This research was approved as exempt from The University of Chicago Biological Sciences Division/University of Chicago Medical Center IRB.

2.2. Data analysis

Microsoft Excel® was used to record and organize quantitative and qualitative data. Quantitative data were analyzed using SAS®. Qualitative data were assessed by four reviewers using an iterative thematic analysis to identify themes and subthemes. A team of four of the co-authors (DM, DG, KJ, GVH) coded narrative responses independently and then met to discuss and decide on final themes. Tallies were made of the number of mentions for each theme, broken down by subtheme when appropriate, and organized with example participant quotes.

3. Results

Of 88 students who attended the four classes that year, a total of 70 participants were consented and enrolled at their first class, and 44 of these completed the follow-up survey (a 62.86% follow-up rate). Fig. 1 shows the study flow chart, with notations for participants lost to follow-up. The average follow-up for the 44 participants was actually four months due to interview scheduling conflicts, with 45.55% of those completed over the phone with participants in their homes, and 54.55% conducted in-person immediately after a yoga class.

Participants primarily found out about the classes through flyers posted in clinics (50.00%), word of mouth (32.00%), and by referrals from providers and staff at the clinics (18.61%).

3.1. Descriptive information: demographics, yoga experience, and attendance

The 70 participants who completed the initial surveys were adults (mean age 52.06), African American (57.14%), Hispanic (41.43%), and female (92.86%), and primarily patients of community health centers (71.2%). The FQHC site had a more culturally mixed population of Hispanic (74.36%) and African-American (25.64%) participants, whereas the free clinic participation was almost all African American (96.77%), reflecting the approximate demographics of the surrounding communities. Table 1 shows race/ethnicity, gender, and age demographics by each study site.

Of all participants, most (59.11%) lived below 200% of the federal poverty level, and a similar proportion were uninsured (58.10%). Of note, this study was conducted in 2013, just prior to the implementation of the Affordable Care Act, and one of the clinic sites was a free clinic of entirely uninsured patients.

Almost two thirds of the participants had no prior yoga experience (65.15%), and two tenths had less than one year (19.71%), while the rest had more than one year (15.15%).

One quarter of the participants had less than a high school degree (25.58%), two tenths had a high school degree (20.93%), almost half had a college degree, some college, or technical school (48.84%), and a few had a graduate degree (4.65%). Almost half were Roman Catholic (45.45%), slightly fewer were Christian (40.91%), and the rest were Muslim, none, and other (13.64%).

The five most frequently reported health conditions and pain areas are listed in Table 2.

3.2. Motivations and barriers in attending

Over the course of the four months, instructor tracking showed the majority of the 44 follow-up study participants attended three or more sessions (n = 27, 61.36%), about one in ten attended two sessions (n = 5, 11.36%), and less than a third attended only one session (n = 12, 27.27%). Six attended ten sessions over three months (13.64%) and thus received the yoga mat incentive.

The most frequently reported barriers for participants attending the classes were family issues (27.10%) and the time of the class not working well (17.11%). Illness and work conflict were also issues.

Yoga class participants initially reported being motivated to attend classes for stress relief (61.41%) and exercise/physical fitness goals (60.00%), while those reporting benefiting from stress relief and finding adequate exercise were slightly lower (57.10% and 52.92%, respectively). At pre-test, about half (52.99%) of class participants were motivated for improved overall health, but only 40.00% of class participants reported benefiting from improved overall health at four-month follow-up. Table 3 shows the motivations, benefits, and barriers from pre to four-month post.

3.3. Pain and stress outcomes

Yoga class participants reported significant reductions both in pain and stress after a single class (mean difference = −2.07, SD = 3.09, $p < 0.0001$ and mean difference −2.48, SD = 3.00, $p < 0.0001$, respectively). Pain and stress were not significantly decreased at four months post, compared to pre-class levels (mean difference = −.64, SD = 2.92, p = 0.1380 and mean difference = −.49, SD = −3.32, p = 0.4059, respectively), but were higher than the immediate post-class levels (mean difference = 1.38, SD = 2.32, p = 0.0002 and mean difference = 1.70, SD = 2.52, $p < .0001$ for pain and stress, respectively). Table 4 shows these results.

Exploratory analyses were conducted to examine differences in pain and stress after four months of attendance based on specific categories of the frequency of class attendance (using Kruskal-Wallis test p-values). No significant differences were found between the number of yoga classes attended (categorized as 1, 2, or 3 or more) and four-month stress or pain scores (p = 0.33 and 0.87, respectively). Using this same test, we found no significant differences between whether one participated in home yoga use or not and four-month stress or pain scores (p = 0.93 and 0.82, respectively). No significant differences in pain and stress were found between sites, although the mean scores of pain and stress were higher for the participants of the class at the free

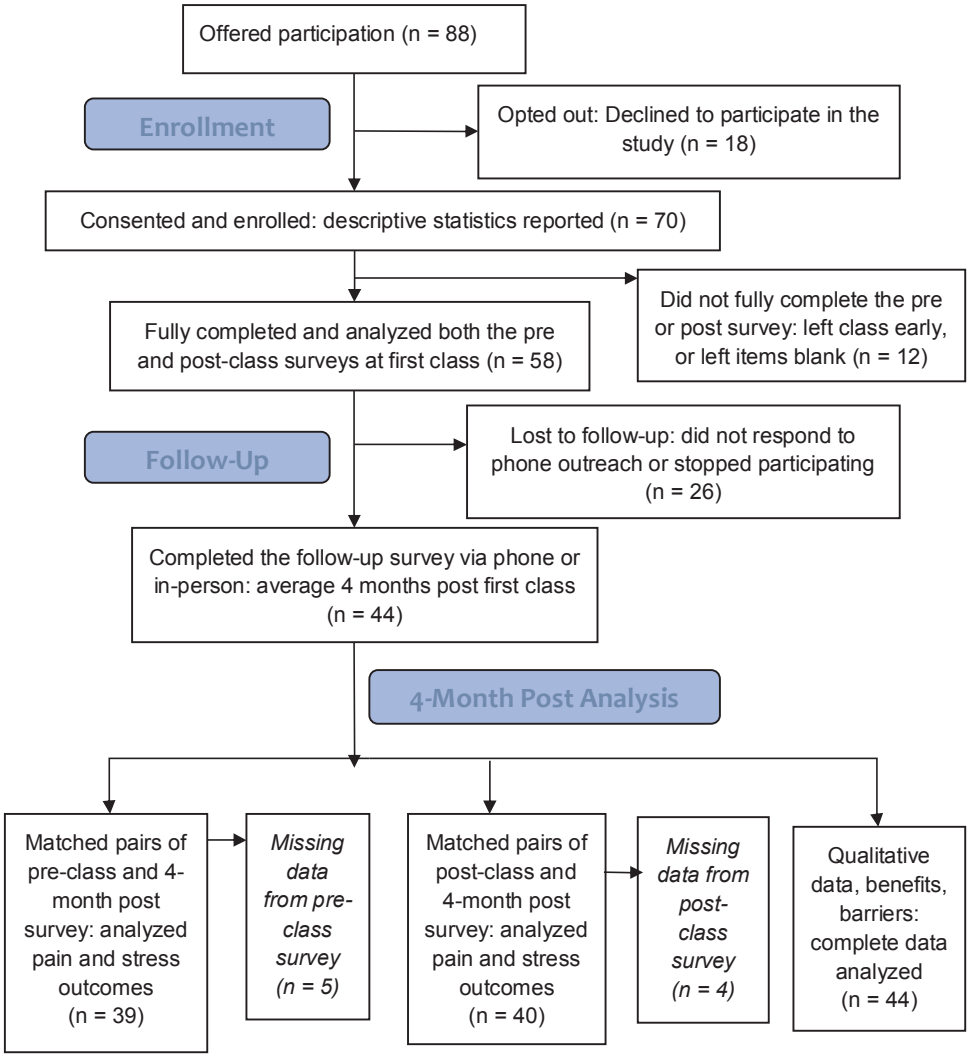

Fig. 1. Yoga Study Flow Diagram.

Table 1
Demographics & Pain and Stress Scores Between Study Sites.

	% *(N)*		
	Site 1 FQHC N = 39	Site 2 Free Clinic N = 31	Overall N = 70
Gender			
Females	94.87 *(37)*	90.32 *(28)*	92.86 *(65)*
Males	5.13 *(2)*	9.68 *(3)*	7.14 *(5)*
Race / Ethnicity			
Black	25.64 *(10)*	96.77 *(30)*	57.14 *(40)*
Hispanic	74.36 *(29)*	0.00 *(0)*	41.43 *(29)*
Other	0.00 *(0)*	3.23 *(1)*	1.43 *(1)*
	Mean ± Standard Deviation		
Age	49.08 ± 14.52	55.86 ± 12.14	52.06 ± 13.85
	Mean ± Standard Deviation		
Health Scores	**Site 1**	**Site 2**	**Overall**
Pre Pain	2.19 ± 2.50	4.70 ± 3.26	3.25 ± 3.09
Post Pain	1.00 ± 0.00	1.00 ± 0.00	1.00 ± 0.00
4-month Pain	1.77 ± 2.01	3.28 ± 2.40	2.39 ± 2.27
Pre Stress	3.19 ± 2.83	4.31 ± 3.23	3.65 ± 3.03
Post Stress	1.03 ± 0.17	1.00 ± 0.00	1.02 ± 0.13
4-month Stress	2.38 ± 2.53	3.28 ± 2.65	2.75 ± 2.59

Table 2
Frequencies of Participant Health Conditions and Pain Areas.

Top 5 Health Conditions *(N = 70)*	% *(N)**	Top 5 Pain Areas *(N = 70)*	% *(N)**
High Blood Pressure	44.29 *(31)*	**Knees**	38.57 *(27)*
Arthritis	28.57 *(20)*	**Back**	34.28 *(24)*
High Cholesterol	22.85 *(16)*	**Shoulder**	21.42 *(15)*
Obesity	20.00 *(14)*	**Hips**	20.00 *(14)*
Diabetes	17.14 *(12)*	**Neck**	18.57 *(13)*

* Columns will not add up to 100% because these were multiple response questions.

clinic (See Table 1).

3.4. Home practice

Of the 44 participants that completed the four-month follow-up survey, the following presents the frequencies of any home yoga practice between the first class and the four-month post survey date, in descending order of response: 2–3 times a week (n = 13, 29.55%), once a week (n = 11, 25.00%), every day (n = 10, 22.73%), 2–3 times per month (n = 5, 11.36%), and never (n = 5, 11.36%).

Table 3
Frequencies of Top 5 Motivations, Benefits, and Barriers Pre to 4-Month Post.

Motivations: *"Why do you want to do yoga?" (Pre N = 70)*	% *(N)*[*]	Benefits: *"How has yoga helped you?" (4-Month Post N = 44)*	% *(N)*[*]	Barriers: *"Why have you missed coming?" (4-Month Post N = 44)*	% *(N)*[*]
Stress Relief/Reduction	61.43 *(43)*	**Relieved Stress**	57.82 *(25)*	**Family Issues**	27.27 *(12)*
Exercise/Physical Fitness	60.00 *(42)*	**Improved Strength/ Physical Fitness**	52.27 *(23)*	**Time Doesn't Work Well**	18.18 *(8)*
Improve Emotional/ Mental Health	55.71 *(39)*	**Improved Emotional/ Mental Health**	54.55 *(24)*	**Being Sick**	13.64 *(6)*
Improve Flexibility	54.29 *(38)*	**Improved Flexibility**	54.55 *(24)*	**Work Issues**	9.09 *(4)*
Improve Overall Health	52.86 *(37)*	**Improved Overall Health**	40.90 *(18)*	**Other**	15.91 *(7)*

[*] Columns will not add up to 100% because these were multiple response questions.

3.5. Qualitative experiences of the class

Qualitative responses to our open-ended questions were analyzed to detect themes and subthemes that emerged from the following questions in the four-month post surveys: (1) "What helped you most?", (2) "What was the most important thing you learned?", (3) "How important were the connections you made with your classmates?", (4) "What was one thing that did not work well for you in these classes?", (5) "What did you like about the teacher?", (6) "What could the teacher do better to help you?", and (7) "What would you like to learn in future classes?"

The themes that emerged are presented in Fig. 2 with example participant quotes that supported each particular theme. The number of mentions refers to how many times that theme was mentioned, even if a participant made more than one mention of a theme.

4. Discussion

4.1. Demographics

Our study examined the uptake and impact of yoga in a racially, ethnically and religiously diverse group of adults from lower socioeconomic backgrounds when free yoga classes were offered in community health centers. Among the thousands of patients served at these community health centers, we found that only a small number attended yoga classes, with the majority of those participants directed to the class by fliers or word of mouth. While the 18% referred by medical providers is substantial, individual interest still drove the majority of class participants. The demographics of class participants approximated those of the surrounding communities.

4.2. Barriers and motivations

The most commonly shared barriers to class participation reflected competing family obligations, inconvenient class times, illness, and work conflicts. Transportation was not frequently reported as a barrier. Of note, the primary motivators for yoga class attendance at the first class were to experience the benefits of stress relief, exercise/physical fitness goals, and anticipated improvements in overall health. Of all those surveyed at four months, including those who only attended one class, slightly fewer people reported experiencing those benefits than those who had anticipated receiving them. A little less than a third of initial yoga class participants chose not to return. Part of that choice may have been that the yoga class did not meet their expectations, and perhaps they did not verbalize these feelings with our study personnel. The majority of class participants did choose to return multiple times.

4.3. Program benefits

Our study echoed the results of prior studies regarding the benefits of yoga, with statistically significant reductions in pain and stress after a single yoga class. However, we did not see the results sustained four months after the first class; rather, pain and stress appeared to increase. We attribute this unexpected rise to a number of factors, specified in our *Limitations* section below.

The qualitative results showed that participants variably experienced other benefits in addition to pain and stress relief. Most notably, they reported relaxation as the primary benefit obtained through breathing and meditation, more so than physical benefits such as increased flexibility or pain relief. Personal growth, empowerment, and emotional health were also important. When asked directly how important community connections made during the class were to participants, over half of the participants reported community connections as important, and a little less than half did not. Future studies could examine how motivations, class homogeneity, physical space, and other factors impact community connectedness and how connectedness may impact the healing benefits of yoga. Learning about these benefits, favorable teacher characteristics, suggestions for teacher improvements, and future learning interests was helpful in understanding how to better design yoga programming in community health centers.

4.4. Limitations

The following details this study's limitations. Our classes were intentionally not standardized, with different instructors, different

Table 4
Differences in Pain and Stress Pre, Post, and 4-Month Post Yoga.

	N[*]	Mean Difference ± Standard Deviation	P-value[**]
Pre-Pain vs Post-Pain	58	−2.07 ± 3.09	< 0.0001
Pre-Stress vs Post-Stress	58	−2.48 ± 3.00	< 0.0001
Pre-Pain vs 4-month Pain	39	−0.64 ± 2.92	0.1380
Pre-Stress vs 4-month Stress	39	−0.49 ± 3.32	0.4059
Post-Pain vs 4-month Pain	40	1.38 ± 2.32	0.0002
Post-Stress vs 4-month Stress	40	1.70 ± 2.52	< 0.0001

[*] N varies due to missing data – pre-pain vs. post-pain and pre-stress vs. post-stress were 58 of 70 enrolled; all other pairs were of the 44 participants who completed the 4-month follow-up surveys.

[**] Obtained using the Wilcoxon signed rank sum test for paired-samples. P-values less than 0.05 indicate a statistically significant difference.

Theme (# mentions) N = 44	Corresponding Example Quotes Organized by Question
"What helped you most?"&"What was the most important thing you learned?" combined responses	
Stress Relief (65):^ (Relaxation (29), Meditation (21), Breathing (15))	• "It helped me de-stress and allowed me to concentrate on myself for that hour."* • "I had a habit of holding my breath if someone said something and I had to think before I reacted. Now I breathe." • "I liked the breathing and moments of silence."
Physical Benefits (41):^ (Stretching & Flexibility (20), Pain Relief (15), Stiffness(6))	• "Being able to be more flexible during the poses. It has helped in loosening up my joints. It makes me move much better and not be as stiff. I don't have to take any medication for my joints to move freely anymore." • "My doctor recommends that I come in for my back pain. My classes have really helped." • "It's helped my aches and pains. I have arthritis in my knees and hands. It helps me a great deal with the pain."*
Personal Growth/ Empowerment (11), Emotional Health (14)	• "I now know how to control my emotions and mood and have more patience and communication with my kids."* • "Learning to let go of your emotions, learning to take it one day at a time. Learning to relax your body more, and your mind."
"How important were the connections you made with your classmates?"	
Community Connections: (Important (25) Unimportant (21))	• "It was real important to see the sisters, taking time to care for ourselves... It was a good camaraderie...People could let their hair down and be silly together. Just laughing." • "[The connections were] good. Because I even got along well with those who don't speak Spanish."* • "They were very important because we are like a family. If someone is not here, he/she is missed. We are very concerned for one another." • "I didn't really talk to many of them that much [because] I'm always on the go." • "We missed a lot of classes, so there weren't any connections."*
"What did not work well in classes?"	
Nothing (22), Physical Limitations (6), Schedule Conflict (3)	• "Everything was good."* • "Downward dog position, I can't stand…some [positions] just aren't safe for me." • "Because of my weight issues, I'm not able to fully perform some of the poses. Also, the time and the day."
"What did you like about the teacher?"	
Personality (20), Professional (5), Personal Attention (9), Knowledgeable (7), Clear Instruction (6)	• "They are patient, understanding, willing to help, calm, and concerned. They are very professional, helpful, and understanding. We have fun!" • "The instructor was able to modify some of the exercises for all levels in the class. She was attentive with each one in class." • "I like the way she instructs us how to do things. Her yoga and her vibes it just goes through…she relieves me. She's relaxing. She's a very good teacher. I like everything about her. I like all of them."
"What could the teacher do better to help you?"	
Nothing (25), Pose Adjustments/Personal Attention (3), Logistics (5), More Relaxation (3)	• "She could tell us what to do to relax more."* • "Try to encourage me to do it at home." • "Just let me know if I'm doing the pose correctly, because I can't see myself, I can only feel myself." • "Maybe to help break emotional barriers down. To push us a little harder to break those barriers down."
"What would you like to learn in future classes?"	
Advanced Yoga Poses (14), Nothing (7), Meditation (6), More Stress Release (6), Yoga Philosophy (5), Life Integration (3)	• "More stretching, more difficult poses." • "A little more meditation because that's the only time I have to meditate." • "Work on a progression path and be able to build up more on exercises." • "Breathe better, concentrate well, and stretch."* • "Once I leave class and walk out into the 'hood, how do you maintain this blissful place when you're looking at whatever it is that you're looking at because it's what is perceived as real: the conditions, poverty, crime, graffiti, that plight of the people?...When I get off of that mat, how do I get up in my body and walk among the masses and maintain that peace and pass it on? Just to be able to master that. I'm trying to change the world."

Fig. 2. Emergent qualitative themes and corresponding participant quotes.

content and length, in different sites, with different populations. Therefore, we do not know what type of class had what type of impact, with participants having variable attendance at classes. We analyzed follow-up data from all participants together regardless of class adherence and class type. We did not separate pain and stress in those who attended the classes specifically geared to pain and stress, or separate those who developed a regular weekly practice from those with what may be characterized as frequent episodic use.

We conducted our four month post-interviews at different times (away from class and after class); those who were interviewed immediately after a yoga class may have had lower pain and stress than those who were interviewed over the phone at various times of day and circumstances, but we were not able to analyze this due to small subgroups.

We also did not compare baseline characteristics of those who demonstrated long-term improvement and those who did not. We did not conduct a multivariable analysis incorporating baseline characteristics of class participants. For those whose motivations differed from the reported benefits, perhaps they were expecting rigorous exercise to increase physical strength and rather found a gentler yoga class than expected, but there is no way to know this because we did not ask for explanations of differences in expectations qualitatively. The study was not powered to detect group differences in the health scores between the free clinic and FQHC, and we did not analyze the qualitative data along lines of sites.

The study population on average had pain and stress scores less than 4 on a 10-point Likert scale, indicating mild to within normal limits of pain and stress among class attendees. Our classes did not attract community members with the highest levels of pain and stress, who potentially could have benefited most from learning new stress management techniques.

Even with these limitations, we found meaningful and significant results and learned valuable lessons. This smaller-scale study has limits of generalizability to other settings, given the study design and implementation. With an increase in sample size, and a more controlled study, we may see longer-term impacts on pain and stress and may have more insight into the factors that influence these results among different sub-populations.

5. Conclusion

The CYDP demonstrated that a racially and ethnically diverse group of middle-to-low-income patients and community members attended yoga classes at community health centers, where transportation was not a major barrier to participation, with flyers and word of mouth the major routes to the class. A single yoga class provided statistically significant decreases in pain and stress, but these benefits were not demonstrated at the four-month follow-up, with our analysis clouded by confounding factors. A majority of initial class participants returned for additional classes. Lifestyle barriers were reported as major barriers to ongoing attendance, and a gap between expectations and experience may have kept others from returning.

Adherence may be improved by providing classes at different times, tailored to different interests/needs, and with additional support programs, such as childcare, to decrease barriers to adherence. The results suggest that having different types of classes, including rigorous, relaxation-focused, and other levels, could increase adherence. Co-locating yoga classes in community health centers in under-resourced neighborhoods is one pathway to addressing disparities in yoga access. Over time, providing safe spaces to establish positive community connections and yoga programs may help alleviate the chronic stress that can exacerbate common chronic diseases.

The lessons we learned have informed the programs of YogaCare, a non-profit yoga service organization with a mission to share the healing benefits of yoga with all populations, and we continue to organize yoga classes in community health centers throughout Chicago.

Conflict of interest

The authors have no competing interests to declare.

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