

Effects of a Kundalini Yoga Program on Elementary and Middle School Students' Stress, Affect, and Resilience

Meliné Sarkissian, EdD,* Natalie L. Trent, PhD,† Karen Huchting, PhD,* Sat Bir Singh Khalsa, PhD†

ABSTRACT: *Objective:* The Your Own Greatness Affirmed (YOGA) for Youth program delivers yoga to urban inner-city schools with the goal of providing practical benefits that support underserved children at high risk of behavioral and emotional problems. A 10-week YOGA for Youth program delivered 1 to 2 times per week was implemented in 3 schools in urban neighborhoods to examine the effect of the program on student stress, affect, and resilience. *Methods:* Thirty children were administered the Perceived Stress Scale, the Positive and Negative Affect Schedule, and the Resilience Scale before and after the yoga program. After the program, informal qualitative interviews were conducted with school teachers, yoga teachers, and students to determine the overall impact of the yoga program. *Results:* The quantitative results of this study indicated that the yoga program significantly improved students stress ($p < 0.05$), positive affect ($p < 0.05$), and resilience ($p < 0.001$). The qualitative results indicated that students, school teachers, and yoga teachers all found the program to be beneficial for students' well-being. *Conclusion:* Taken together, these data suggest that the YOGA for Youth program may provide students in low-income urban schools with behavioral skills that will protect against risk factors associated with the development of behavioral and emotional problems.

(*J Dev Behav Pediatr* 39:210–216, 2018) **Index terms:** stress, resilience, affect, yoga in schools, yoga program.

Today's school-age children face a multitude of stressors, including academic, peer, familial, and environmental. Without the necessary skills to decrease and regulate chronic stress and its corresponding emotional manifestations, children are at risk of developing many physical and mental health problems.^{1–3} In fact, a longitudinal study of the prevalence of mental health conditions in children and adolescence in the United States found that the cumulative prevalence for the occurrence of at least 1 clinically significant mental health condition by the age of 21 years was over 80%.⁴ Children from low-income and minority populations are at a greater risk of chronic stress because of environmental factors such as poverty, violence, racism, crime, and drug use.^{3,5} As such, children from these communities are more likely to have emotional dysregulation, leading to unhealthy coping behaviors and a greater risk of noncommunicable diseases (e.g., poor diet and lack of physical activity) and psychological and behavioral difficulties.³ Therefore, to successfully adapt

to challenging circumstances, it is particularly important that children and adolescents from low-income and high minority communities have access to behavioral intervention strategies for stress reduction, self-regulation, and the ability to cultivate resilience.¹

The practice of yoga has been adopted by Western society and its popularity is rapidly increasing. A 2015 report from the National Center for Health Statistics (NCHS) at the Center for Disease Control and Prevention (CDC) indicated that 9.5 percent of adults in the United States practice yoga, with a 36% increase from 2007.⁶ An NCHS CDC survey on complementary and alternative medicine use in children between the ages of 4 and 17 years showed a similar pattern to that of adults, with a 32.3% increase in children practicing yoga from 2.1% in 2007 to 3.1% in 2012.⁷ Yoga is a comprehensive-mind-body practice that includes physical postures, meditation, and breathing exercises. As a multi-component mind-body practice, yoga exerts its positive effects through the enhancement of mind-body awareness (e.g., mindfulness and attention), self-regulation (e.g., stress and emotion regulation), and physical fitness (e.g., flexibility and strength).¹ Integrating yoga into schools may give children the necessary tools to improve their social and emotional learning,¹ which includes “the competencies to understand and manage emotions, set and achieve positive goals, feel and show caring and concern for others, establish and maintain positive relationships, and make responsible decisions.”⁸

Social and emotional learning is related to the development of resilience, the ability to thrive and adapt under difficult circumstances, allowing for healthy

From the *Department of Educational Leadership, School of Education, Loyola Marymount University, Los Angeles, CA; †Department of Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, MA.

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Address for reprints: Karen Huchting, PhD, School of Education, Loyola Marymount University, 1 LMU Drive, Suite 2300, Los Angeles, CA 90045; e-mail: karen.huchting@lmu.edu.

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development despite challenging external conditions.⁸ Resilience is associated with self-regulation,⁹ and practices that foster resilience through self-regulation, such as yoga, may serve to prevent the detrimental outcomes associated with unregulated chronic stress, such as the development of psychiatric disorders (e.g., depression and anxiety).¹ School-based yoga intervention research is a growing field that is still in its early stages, but the initial results are promising. A 2016 review of yoga in school studies reported that yoga programs improve students' resilience, stress, and affect.¹⁰ A 2015 systematic review of such programs examined 9 randomized control trials and found positive effect size improvements for mood indicators, tension, anxiety, self-esteem, and memory, when the yoga groups were compared with the control group.¹¹

School-based yoga programs that increase resilience are particularly important for schools with low-income, minority children because of the stressors they are typically exposed to.^{3,12} However, a few school-based yoga studies have been conducted with these at-risk populations, and no studies have investigated the effect of Kundalini yoga (as taught by Yogi Bhaajan). Kundalini yoga is a relatively unique type of yoga, in that it incorporates specific sequences of physical postures in addition to a strong focus on breathing and meditation. Kundalini yoga is somewhat different from other forms of yoga, in that in addition to traditional physical postures, breathing, relaxation, and meditation practice, there is also a combination of specific exercises called kriyas that target specific areas of physical, mental, and emotional functioning (i.e., mood state, cognitive performance, the circulatory system, the liver, or the lymphatic system). As of 2015, there were 36 different school-specific yoga programs implemented across 940 schools in the United States.¹³ A white paper was recently published by the Yoga Service Council that outlines the best practices for implementing yoga-based programs in schools, including the importance of developing standardized yoga programming that meets the needs of the particular school and student population.¹⁴ One program, the Your Own Greatness Affirmed (YOGA) for Youth, delivers Kundalini yoga to urban inner-city schools with high African-American and Latino populations, with the goal of providing practical benefits that support underserved youth who are at high risk of behavioral and emotional problems. There are currently over 300 trained YOGA for Youth instructors, with programs in the United States, Canada, and Mexico.¹³ The purpose of this study was to examine the effect of the YOGA for Youth program on children's psychological health in a high minority, urban school setting. We hypothesized that the 10-week yoga program would improve self-reported stress, affect, and resilience.

METHOD

Yoga Program

Although there are numerous approaches to yoga, a Kundalini yoga-based program was chosen as the

intervention for this study because it is a holistic and comprehensive approach to yoga practice. In each class, kriyas (specific sequences of physical postures or asanas), pranayama (breath work), and meditation are practiced. Meditation is an important aspect in Kundalini yoga practice. Meditation helps to exercise the ability to self-regulate thoughts and emotions and brings one's thought patterns into awareness. In addition, the preparation of the physical body through yoga postures releases tension and stress from the body.

The lead researcher (M.S.) worked with a nonprofit organization called Your Own Greatness Affirmed (YOGA) for Youth to implement the Kundalini yoga-based program. YOGA for Youth has implemented yoga in juvenile incarceration facilities, prisons, and after-school programs across the nation for over 16 years. "The YOGA for Youth mission is to provide urban youth with tools for self-discovery that foster hope, discipline and respect for self, others and community" (www.yogaforyouth.org). Each yoga teacher was trained in the 10-week curriculum (Table 1) before implementing the yoga program. The same curriculum was applied in each school, although the yoga teacher had discretionary authority to customize the timings and activities to suit the needs of the class (Appendix A, <http://links.lww.com/JDBP/A170>).

Authorization from the school principal was obtained to implement the yoga program for 10 weeks during the fall semester of the academic year. The program was taught during the participants' regularly scheduled 50-minute physical education class or after school, 2 times per week, by specially certified YOGA for Youth yoga teachers. Because of budget constraints, 2 of the schools were able to provide yoga only once a week, 66.7% of students practiced once a week, and 33.3% of students practiced twice a week. Male and female participants had separate classes to ensure comfort, openness, and concentration.

Participants

A convenient cluster sampling approach was used, such that relationships with schools became the source for recruiting schools for the yoga program and study. Power calculations were not conducted because of the preliminary nature of the study and the lack of control over the number of students that the schools could accommodate in the program. The results from this study can be used for power calculations for future research. Of the 5 schools contacted, 3 opted to participate. All public schools were located in urban low-income communities in Southern California. Schools announced the yoga program to students and made arrangements for the yoga class to be implemented during a time that was most convenient for the school. Because of budget constraints, School A chose to offer an after-school class only to female students. The school encouraged the female population in grades 5 through 8 to participate and 13 students enrolled in the study. School B also opted for

Table 1. Program: Kundalini Yoga Curriculum

| Weeks | Categories | Activities | Length of Time |
|-------|------------|--|------------------------|
| 1–3 | Pranayam | Sitali pranayam | 3–7 min |
| | Kriyas | Sun salutation warm-up | 5 min |
| | | Awakening yourself to your 10 bodies | 30 min |
| 4–5 | Meditation | Kirtan kriya (Sa Ta Na Ma) | 3–7 min |
| | Pranayam | Segmented breath (8:4:8:4) | 3–7 min |
| | | Kriyas | Sun salutation warm-up |
| 6–7 | Kriyas | Kriya for elevation | 31 min |
| | | 7-wave Sat Nam | 3–7 min |
| | Meditation | Alternate nostril breathing | 3–7 min |
| 8–10 | Pranayam | Sun salutation warm-up | 5 min |
| | | Abdominal strengthening | 31 min |
| | Meditation | Calm heart | 3–7 min |
| 8–10 | Pranayam | Extended breath of fire ego eradicator | 3–7 min |
| | | Kriyas | Sun salutation warm-up |
| | Meditation | Magnetic field and heart center | 31 min |
| | | Ra Ma Da Sa—Sa Se So Hung | 3–7 min |

1 yoga class because of budgetary constraints. They opened the class to female volunteers from grades 4 and 5 for an after-school program and 18 students enrolled. School C opted to have both a male and female class during a regularly scheduled physical education class. For scheduling convenience and because of yoga teacher availability, a grade 6 female class was chosen followed by a grade 7 male class, and a total of 25 students enrolled in the study. The decision to separate male and female students was made by YOGA for Youth for the comfort of the students based on their experience working with other schools of a similar socioeconomic demographic. Parental consent and child assent were obtained, and only students who provided signed parental consent forms and assented participated in the study. All research procedures were approved by the university's institutional review board.

Measures

We used surveys designed to measure the 3 dependent variables: perceived stress, emotional state, and resilience. Surveys were administered before the start of the yoga program and immediately after completion of the 10-week yoga program. Measures were primarily chosen based on their sensitivity to previous yoga interventions with children.

Perceived Stress

The Perceived Stress Scale (PSS)¹⁵ is a 10-item questionnaire with a 5-point Likert scale of 0 (never) to 4 (very often). Sample questions for perceived stress include the following: (1) In the last month, how often have you felt nervous and “stressed”? (2) In the last month, how often have you felt that things were going your way? (3) In the last month, how often have you

been able to control irritations in your life? Several items were reverse scored so that positively stated items (4, 5, 7, and 8) were scored consistently with the rest of the items. The PSS had sufficient internal reliability with a Cronbach's alpha of 0.68. A mean composite of perceived stress was subsequently created. Although the PSS has been used in previous studies with children, it has yet to be statistically validated in children.

Affect

The Positive Affect and Negative Affect Schedule—Child Form (PANASC)¹⁶ is a derivative of the original PANAS and PANAS-X developed by Watson and Clark and was developed using 707 students in grades 4 to 8.¹⁶ It is a self-report measure that differentiates anxiety from depression to measure internalized emotions.¹⁶ The PANASC is a 30-item inventory of 15 positive (e.g., excited, cheerful, proud, and calm) and 15 negative affect (e.g., afraid, nervous, sad, and upset) terms, measured on a 5-point Likert scale of 1 (very slightly or not at all) to 5 (extremely). Both the Positive and Negative Affect demonstrated a strong internal reliability, with a Cronbach's alpha of 0.83 for Positive Affect and 0.90 for Negative Affect. Two separate summed indices were created for the Positive Affect (15 items) and Negative Affect (15 items).

Resilience

The Resilience Scale (RS)¹⁷ included 25 items measured on a 7-point Likert scale of 1 (disagree) to 7 (agree). Some sample questions include (1) When I make plans, I follow through with them; (2) I am friends with myself; and (3) It's okay if there are people who do not like me. The RS had a strong internal reliability, with a Cronbach's alpha of 0.92. For this scale, higher scores reflect greater individual resilience. A summed composite was created to reflect total resilience. Similar to the

PSS, the RS has been used in adolescent/child populations. However, although it was created at the grade 6 level of comprehension, it is yet to be formally, statistically validated in children.

Data Collection

A packet of questionnaires including the 3 measures, PSS, Positive Affect and Negative Affect Schedule—Child Form, and RS, were distributed to participants on the first day of the yoga program before the first yoga class and on the last day of the yoga program after the last yoga class. Depending on the age group, the amount of time spent taking the surveys lasted from 15 to 25 minutes.

Qualitative Interviews

In addition to the surveys, informal interviews were conducted with staff. Informal interviews lasting between 5 and 10 minutes were conducted with 10 randomly selected students from the total sample (N = 30). In addition, 2 of the 3 yoga teachers and 3 classroom teachers (1 man and 2 women) were interviewed. Interviews were conducted to explore their perceptions of the program's effectiveness. Students were asked to describe their overall experiences with the yoga class. Students were also asked how they had integrated anything from the yoga class into their home or academic lives. Yoga teachers were asked to provide feedback about the implementation of the yoga classes, including what they would continue doing, improve, or do differently next time. Classroom teachers were asked whether they experienced any differences among students who took the yoga classes. The interviews were designed to be open ended to capture feedback about the overall experience with the yoga classes; therefore, there was no a priori hypothesis for this portion of the study. The primary Principal Investigator conducted all of the interviews and coded the interviews for emergent themes. The analytical coding for the students focused on their overall well-being, application of the Kundalini yoga outside of the program, general understanding of yoga, and how much the students liked yoga and whether they wanted to continue the practice. The classroom teachers' interviews were coded for their general impression regarding any changes they may have observed in the students, which could be attributed to the yoga program. The yoga teachers' interviews were coded for their overall impression of the course, the effectiveness of the curriculum, students' attitudes toward the yoga practice, and any changes they observed in the students' emotional and physical well-being.

RESULTS

Participants

Of the 56 students (male = 15 and female = 41) who enrolled in the study, complete survey data at both pre- and post-yoga program were received from 30 students

(male = 5 and female = 25). As such, analyses are provided for those 30 students. This final sample consisted of 83% female and 17% male students and 50% Latino and 50% African-American students. Students' ages ranged from 9 to 14 years depending on their grade level. The breakdown of the demographics for each school can be found in Table 2.

Statistical Outcomes

Given that the yoga program was implemented in 3 different schools, we first examined whether participants differed significantly on any of the dependent variables of stress, affect, and resilience at baseline. No significant differences were found between schools and no differences were found between male and female students at baseline. Given that the intervention was standardized across all schools and that no significant differences existed between groups, participants from all 3 schools were combined for subsequent analyses. A dependent samples *t* test was then used to examine changes in the dependent variables of stress, emotional affect, and resilience from before and after the yoga program (Table 3).

There was a significant decrease in perceived stress from baseline to postprogram, with a medium effect size (Cohen's *d* = 0.42). Positive affect on the PANAS-C significantly increased from baseline to postprogram, with a medium effect size (Cohen's *d* = 0.41). Furthermore, there was a significant increase in resilience on the Resilience Scale from baseline to postprogram, with a medium effect size (Cohen's *d* = 0.53). Unexpectedly, there was no significant difference observed for negative affect.

Qualitative Interviews

Students

The overall impressions of the students interviewed were positive regarding the yoga program. Students

Table 2. Demographics of Participants Who Completed Baseline and Post-Program Assessments (N = 30), Organized by School

| Variable | School A | School B | School C | Total |
|---------------------------|----------|----------|----------|---------|
| Total no. of participants | 6 | 10 | 14 | 30 |
| Male, N (%) | | | 5 (36) | 5 (20) |
| Female, N (%) | 6 (100) | 10 (100) | 9 (64) | 25 (80) |
| Grade, N (%) | | | | |
| Fourth grade | | 8 (80) | | 8 (27) |
| Fifth grade | 4 (67) | 2 (20) | | 6 (20) |
| Sixth grade | | | 9 (64) | 9 (30) |
| Seventh grade | | | 5 (36) | 5 (17) |
| Eighth grade | 2 (33) | | | 2 (6) |
| Race/ethnicity, N (%) | | | | |
| African-American | | 7 (72) | 8 (56) | 15 (50) |
| Hispanic/Latino | 6 (100) | 3 (28) | 6 (44) | 15 (50) |

Table 3. Paired Samples *t* Test (N = 30)

| Variable | Baseline | | Post | | 95% Confidence Interval | | <i>t</i> |
|-----------------|----------|-------|--------|-------|-------------------------|-------|----------|
| | M | SD | M | SD | Lower | Upper | |
| Stress | 17.33 | 7.19 | 14.37 | 7.03 | 0.41 | 5.52 | 2.38* |
| Positive affect | 45.23 | 11.39 | 49.27 | 8.20 | -7.18 | -0.89 | 2.62* |
| Negative affect | 29.33 | 11.97 | 30.80 | 11.15 | -5.49 | 2.57 | 0.75 |
| Resilience | 122.30 | 25.01 | 135.80 | 26.24 | -21.22 | -5.78 | 3.58** |

* $p < 0.05$; ** $p < 0.001$.

reported using the breathing and meditation techniques in various real-life applications, including classroom behavior, positive attitudes toward friends, emotional regulation (anger and anxiety control), and resilience, expressed in terms of greater self-control and calming effects, which resulted in less stress and greater overall well-being. Some students attributed the yoga practice to their ability to focus and do better in school, with a direct relation to achieving better grades.

Classroom Teachers

Overall, all 3 teachers interviewed had positive impressions of the yoga program. When asked whether they observed changes or differences in the students, which they attributed to the yoga program, their responses were varied, although all positive, ranging from improved focus and concentration to perceived changes in attitude toward other students who were more tolerant, helpful and mature. Teachers also observed enhanced emotional regulation and conflict resolution as outcomes when implementing techniques learned from the yoga practice.

Yoga Teachers

The yoga teachers interviewed reported that they observed that the students had developed and matured over the weeks they had taught the students. For example, students seemed to be more emotionally stable and less reactive to peer behavioral triggers, and they were able to stay focused and calm and engaged in discussions with greater self-awareness. They also reported that their attention spans and resilience had increased over time, particularly during the meditation practice, and also their ability to hold postures with complete focus and breath work. In addition, change in students' disruptive behavior to self-regulation was another factor that had greatly improved during the yoga classes. With respect to class logistics, the yoga teachers felt that behavior and classroom management was sometimes a challenge. Two of the 3 schools implemented the yoga program after school, and for example, 1 teacher felt that because the yoga program was seen as supplemental, the class was not taken seriously by some of the students. However, the other yoga teacher, who also taught the class after school, felt that over the course of the intervention, students grew to understand and respect their yoga practice time to the extent that they wanted

their friends, siblings, and parents to get involved (Appendix B, <http://links.lww.com/JDBP/A169>).

DISCUSSION

This is the first study to assess the effect of a school-based Your Own Greatness Affirmed (YOGA) for Youth program on the psychological health of children in elementary and middle school. The results reported here indicate that the program improved students' stress, positive affect, and resilience in high-minority populations within urban school settings. As mentioned previously, children from low-income and minority populations (e.g., Hispanic) are more likely to be exposed to stressors such as poverty and violence, which can negatively affect the functioning of the systems regulating stress and emotion.^{3,5} This is particularly true for children and adolescents who experience chronic stress in their daily lives, creating an ongoing sympathetic arousal and emotional dysregulation. Early-onset chronic stress has cumulative effects that can have detrimental psychological and physical effects on development.² Therefore, children and adolescents in this demographic require more than the average educational experience to effectively face and overcome challenges and make healthy choices in their daily lives and need behavioral skills to sustain them through their educational and social pressures.

Yoga fulfills this need with its potential to reduce stress, regulate emotions, and build resilience. Unmanaged stress is a major contributor to mood disturbance, therefore, improving stress regulation and ultimately mood during childhood can prevent the development of psychiatric illness later in life.¹⁸ In the current study, students' positive affect was significantly improved after the yoga program, which aligns with the results of previous studies showing that yoga and mindfulness in schools lead to improvements in students' affect.^{10,19}

Unexpectedly, there was a nonsignificant increase in student negative affect after participating in the program. However, other studies have reported a significant increase in negative affect in middle-school students after a school yoga program.^{20,21} One postulation for why this occurred is that participants' mind-body awareness increased with the yoga practice, thereby leading them to become more aware of their emotions, whether positive

or negative.^{20,21} Another possible explanation is that the participants may have been better capable to handle their negative emotions through increased resilience, allowing them to surface.^{20,21} Therefore, it is reasonable to postulate that improvements in negative affect may occur with long-term follow-up once children have learned to have a greater awareness and regulation of their emotions with continued yoga practice.

Importantly, the yoga program increased resilience, a critical protective quality for children who frequently face adverse circumstances. Resilience is believed to be inherent in biological and psychological factors that make up an individual's capacity to cope under adverse conditions.²² A defining factor that may ultimately contribute to the level of resilience is an individual's locus of control.²³ Previous studies have shown that those who experienced some control over their stressful circumstances exhibited more resiliency than those who felt helpless in the face of life events.^{9,23} A previous randomized controlled trial of a school-based yoga program reported that yoga increased resilience.²⁴ Yoga practice may increase the sense of control and self-efficacy with respect to stress and emotion, thereby increasing resilience.

There were a few limitations related to both program implementation and study design. The yoga program included mantras, meditation, and pranayama, which may have created some discomfort in the children because of unfamiliarity or their personal history; for example, some students may have felt apprehensive about closing their eyes during a meditation, especially those who may have had a history with trauma. Furthermore, there may also have been some controversy surrounding the yoga practice (e.g., regarding parental concerns about religious conflicts). However, in some cases, with the student's insistence and after the parent observed the class, a student was able to rejoin and complete the program. For these reasons, a Yoga Service Council monograph has recommended that school-based yoga programs be secular.¹⁴ Despite the aforementioned challenges of implementing yoga in the school setting, such programs are becoming more accepted, particularly with the development and use of standardized yoga programs, such as Kripalu Yoga in Schools, Yoga Ed, and YOGA for Youth, all of which consciously align the programs with existing public school regulations requiring secular programming and are adapted to the needs of the school and particular student population. Last, the current study had a response rate of only 53.6%, which is comparable with other studies.²⁰ Future studies will benefit from conducting a power analysis based on the current results to determine the number of children required for recruitment.

Because YOGA for Youth funded 75% of the program, schools had to provide the remaining 25% of funding, limiting the study to 3 schools with the financial ability to support the project. Although these 3 schools are still characterized as urban, low income, and high minority,

findings might not generalize to similar schools with the inability to provide at least some funding to support the program. As mentioned previously, 2 of the 3 schools opted to have only 1 yoga class per week because of budget constraints. As such, findings indicating improvement in children's psychological health are noteworthy, given that the yoga practice only occurred once per week for most participants. With respect to pragmatic fiscal concerns of schools, these results indicate that administering the yoga program only 1 day per week may be sufficient to improve children's psychological health. Future work should compare the effect of administering yoga once or twice per week. Another limitation was with respect to sex, with 2 schools choosing to offer the yoga class only to female students, therefore limiting the male sample size for the study to only 17% of the study population. This is particularly relevant considering previous quantitative and qualitative studies that have reported sex differences with respect to response to and perception toward the yoga program.^{20,25}

The nature of variations in student abilities in reading and comprehension was a limitation for administering questionnaires, particularly when the yoga class had a range of grade levels such as in School A with grades 5 through 8. The grade 8 students, for example, were able to work independently and complete the surveys within 15 minutes, whereas the grade 5 students took almost the duration of the class time with consistent assistance from the principal investigator. Some of the items were unclear for the younger students, and some items on the self-report questionnaires had to be defined for the children during the questionnaire administration, which may have affected the validity of the measures. In addition, although used in children, the Perceived Stress Scale has yet to be statistically validated in child and adolescent populations.

The yoga teachers felt that students' behavior and classroom management was sometimes a challenge, potentially reducing the engagement of the students with yoga. Therefore, student engagement and attendance should be measured in future studies to be able to statistically assess these factors. Furthermore, some deviations from the YOGA for Youth curriculum and program may have limited the consistency of the yoga program such as inclusion of music and dance in some instances. Music can be used during a Kundalini class as a teaching aid at the teachers' discretion. For example, soothing music can be used during savasana (relaxation time) to allow the students to relax. Further inconsistencies resulted from differences in personal teaching styles; however, the same 10-week program was offered at each school.

Overall, the data from this preliminary trial are supportive for the role of yoga in urban school settings, although rigorous randomized controlled trials are necessary to evaluate this definitively. YOGA for Youth offers a valuable opportunity for children and adolescents in urban, low-income schools who are subject to

high stress levels to acquire skills to alleviate stress, regulate emotions, and increase resilience.

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