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ORIGINAL PAPER

Yoga in an Urban School for Children with Emotional and Behavioral Disorders: A Feasibility Study

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Abstract Increasingly, school-aged children present with challenging emotional and behavioral problems and may be resistant to traditional special education approaches (Smith et al., Behav Disorders 36(3):185–194, 2011). These programs do not take into consideration the specific needs of students with emotional and behavioral disorder (EBD). We examined the feasibility and potential for positive effects of yoga sessions within a school setting for children with EBD at an urban elementary school. Thirty-seven children with EBD in an urban school completed a yoga intervention in small groups (7–10 students) twice per week for 3 ½ months. Teachers, parents, and students completed a systematic pre- and post-intervention assessment, and yoga instructors completed attendance and behavior checklists. Average attendance for the yoga sessions was 90 %. Eighty percent of responders described being very satisfied with the intervention. Teachers reported improved attention in class ($p = 0.01$) and adaptive skills ($p = 0.03$) and reduced depressive symptoms ($p = 0.03$), behavioral symptoms ($p = 0.01$), and internalizing symptoms ($p = 0.04$). No significant changes were found in the parent data and no discernable trend was found in student reports. These data suggest that yoga administered in small groups in an urban school setting is a feasible school intervention for children with emotional and behavioral disorders and may be effective in reducing symptoms.

Keywords Yoga · Emotional and Behavioral Disorder · Special education · Mindfulness · Meditation

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Introduction

Increasingly, school-aged children present with challenging emotional and behavioral problems and may be resistant to traditional special education approaches (Smith et al. 2011). The estimated point prevalence of school aged children with Emotional and Behavioral Disorders (EBD) in the U.S. is 12–13 % and these children present with at least moderate impairment (Forness et al. 2011; Merikangas et al. 2010). This number is estimated to be higher in children from disadvantaged urban communities (Macomber and Moore 1999). Children from minority backgrounds have even less access to mental health services and are less likely to receive the care they need (Samaan 2000). Untreated emotional and behavioral disorders are associated with negative outcomes including poor grades, poor personal relationships, failure to complete high school, unemployment, incarceration, substance abuse, and suicide (Smith et al. 2011).

Students with Emotional and Behavioral Disorders (EBD) display highly variable internalizing and externalizing symptoms, representing many psychiatric disorders like anxiety, depression, posttraumatic stress disorder (PTSD), oppositional defiant disorder and conduct disorder. EBD symptoms manifest themselves within classrooms in extremely high rates of problem behaviors (e.g., aggression, fighting, disruption) and low rates of appropriate behaviors (e.g., positive social interactions, time on-task) (Jack et al. 2004; National Center for Special Education Research [NCSER] 2006; Seidman 2005). Disruptive behavior problems (e.g. fighting in class, aggression, impulsivity, disruptiveness) are the most debilitating of EBD symptoms and highly correlate with academic failure (NCSER 2006; Wagner et al. 1991).

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This places an additional burden on the school system to deal with complex and challenging emotional behavioral situations that can impede academic progress (Burns et al. 1995). Teachers in urban schools are therefore confronted with significant classroom disciplinary challenges and can spend up to a fifth of their time disciplining students rather than teaching (Lippman et al. 1996). While a high percentage of children might benefit from one-on-one school counseling services, budgetary and other pragmatic considerations have led schools to consider more efficient approaches to help children cope with stress in the face of emotional and developmental disorders.

Our proposed method to address this problem is yoga training, a multimodal form of exercise that helps children (and adults) overcome stress and maximize their performance (Grossman et al. 2003; Kabat-Zinn et al. 1992). Over the past decade, yoga has developed from a poorly-understood discipline, to become a focus of considerable research. Specialized training programs now certify yoga instructors to lead sessions that meet the developmental needs of children. These yoga protocols are secular and do not entail any religious components. Yoga is a mind–body practice that combines multiple mind–body techniques (Schure et al. 2008; Wolsko et al. 2004). The components of traditional yoga generally include calm breathing, postures, and meditation. Calm breathing is thought to help focus the mind and regulate the autonomic nervous system and as a result fosters relaxation. Physical poses include standing balance, forward bend, back bend, and twisting poses which are thought to improve flexibility and strength; while relaxation and meditation are thought to calm down and help focus the mind.

Mind–body practices such as yoga, meditation, guided imagery, and mindfulness (National Center for Complementary and Alternative Medicine [NCCAM] 2011) are commonly practiced in adult populations (Barnes et al. 2008). In a study looking at meditation and cognitive functioning, Mohan et al. (2011) examined 32 healthy adult males who had never practiced meditation and measured the effects of meditation on stress-induced changes in cognitive functions. It was found that meditation was associated with relaxation, and when practiced before a stressful situation, reduced the effects of the stress. In another study examining the effect relaxation and guided imagery techniques have on quality of life indices in women with breast cancer receiving internal radiotherapy treatment, a relaxation and guided imagery intervention was presented to the experimental group 1–2 weeks prior to radiotherapy and effects were compared to a control group who did not receive this intervention. The experimental group received training for these techniques and was given an individualized cassette with instructions and descriptions of pleasing images. Significant reduction in anxiety ($p = 0.008$) and depression ($p = 0.04$) scores were found compared to the control group (León-Pizarro et al. 2007).

Mind–body techniques teach children to improve their attention skills, which can help their performance in school. Improvements in coping skills can combat feelings of discomfort in stressful situations at school or at home. For children, relaxation training has been studied in isolation. In a randomized controlled trial, Lohaus et al. (2001) examined effects of muscle relaxation versus imagery based relaxation on physiological and subjective responses (e.g., mood, physical well-being) in 8–10-year old children. The control condition received neutral stories. Relaxation was most strongly associated with imagery-based relaxation training due to a physiological pattern with a reduction in heart rate and skin conductance. In comparison, an increase in heart rate was found in the muscle relaxation training condition. Further, there was an increase in children's ratings of positive mood and physical well-being in all conditions; however these increases in ratings showed no significant differences between the different conditions. Another study involving teaching relaxation techniques to 50 children with behavioral problems found reduced symptoms compared to the control group on the parent Child Behavior Checklist (Goldbeck and Schmid 2003).

Yoga may enable children with a range of disabilities to increase awareness of their emotional state through practical and well-rehearsed techniques (Carthy et al. 2010; Impett et al. 2006; Peck 2005). For example, yoga has been found to promote relaxation and greater self-awareness, self-control and concentration among children with a variety of physical diagnoses, e.g., epilepsy, asthma, and irritable bowel syndrome (Krusche 1999; Kuttner et al. 2006; Sirven 2003). In one study, fourteen 8–13-year olds with ADHD were randomly assigned to a yoga intervention or a control with cooperative group activities. The children, who received 20 weekly one-hour yoga sessions, significantly improved on two subscales of the teacher and parent Conners' rating scale compared to the control group (Jensen and Kenny 2004). In another study of 19 children with ADHD, one group of children received yoga and the other received conventional motor exercises. In the yoga group, the change in ADHD symptoms was greater than in the conventional motor training, although the small sample size limited statistically significant findings (Haffner et al. 2006). A third study included a 3-week yoga intervention for ten first to third grade children with attention difficulties. Before the intervention there was a substantial difference in on-task behavior noted between students with attention difficulties and their peers. After the intervention, classroom observations showed that the intervention children were on-task at the same rate as comparison students who did not have attention issues (Peck 2005).

Yoga training and exercise programs share many of the same benefits attributed to physical movement. A number of studies of yoga for children have found improvements in gross motor (Telles et al. 1993) and fine motor (Dash and Telles 1999, 2001) skills, increased cardiac performance, and even an increase in respiratory parameters (Madanmohan et al. 2003). As beneficial as standard exercise programs can be, they have their limits. A Cochrane review of 16 studies of exercise interventions included vigorous physical activity that could be in addition to physical education classes in school, walking to/from school, and/or exercise from play activities, to treat anxiety and depression in children. All exercise interventions studied were for at least 4 weeks. The review yielded inconclusive results (Larun et al. 2006). In comparison, yoga training is thought to be more multidimensional than exercise, including relaxation training, visualization and meditation in addition to exercise.

We are unaware of any study that has looked at the effects of delivering yoga to children with EBD within the school setting. Our objective was to conduct a pilot study examining the feasibility of yoga training in groups for children with emotional-behavioral disorders in an urban school setting as an intervention to support emotional and behavior well-being and teach coping skills. We hypothesize that (1) the students will readily participate in the yoga sessions and be receptive, (2) the yoga training sessions will easily integrate into the children's school schedule, (3) that the intervention be well received by both the student's teachers, and (4) participants will have improved attention in class and behavior symptoms at school and at home.

Method

Participants and Procedure

Participants

Participants were children in fourth and fifth grade (ages 8–11) at an urban elementary school, identified by the special education director and the teaching staff as having an emotional and behavioral disorder including anxiety, depression, aggression, conduct disorder, hyperactivity and attention difficulties. These grades have a combined student population of 160 students. Students were enrolled over 2 years.

Inclusion/Exclusion Criteria

Children were eligible to enroll if they were identified by the teaching staff or special education director as having an emotional and behavioral disorder. Exclusion criteria included an inability to comprehend English sufficiently to complete written assessments and follow the yoga intervention.

Children were included regardless of whether they were receiving other psychosocial treatments such as counseling or psychopharmacologic medications. All families were encouraged to continue scheduled appointments with their pediatrician and any other clinicians.

Enrollment

Through review of children's school records, the special education staff identified students with EBD with either internalizing symptoms or externalizing symptoms. Over the 2-year yoga intervention the teaching staff and the special education department identified 74 students with emotional and behavioral disorders and sent their parents an informational flier regarding participation in the study. Children who were identified for the study had already been documented with EBD and parents were already aware of their children's difficulties. Interested parents then completed the required paperwork for their child to enroll. All parents of participants signed an informed consent document, and students provided assent. The protocol was approved by Tufts Medical Center's Institutional Review Board.

Description of the Intervention

Participants received two yoga sessions per week during the school day for 3½ months. Students were placed into yoga sessions based on their classroom schedule so they would not miss critical academic time. Sessions were conducted before lunch at either 9:15am, 10:15am, or 11:15am. The yoga sessions were taught by certified yoga instructors experienced in yoga instruction for children. In the United States, a certified yoga instructor has to complete at least a 200 h yoga teacher training program by a formal yoga studio in order to be considered a certified yoga teacher. The trained yoga instructors were accompanied by one research support staff member for every session.

The sessions followed the Yoga Ed Protocol, a leading yoga curriculum for children. Yoga Ed is a nationally recognized organization which produces cost-effective yoga-based trainings, protocols, and materials for teachers, children, and parents. The Yoga Ed programs were developed to foster a social-emotional well-being curriculum (e.g., self-control and emotion regulation) in an innovative way through the practice of yoga techniques (Yoga Ed 2005). One-hour sessions included the four steps of a structured children's yoga session:

1. The session typically started with *relaxation* training, helping children transition from previous activities to concentrating on sensations within their bodies, minds and emotions in that moment. *Breathing techniques* are emphasized.

2. Child-adapted yoga *exercises and postures*, such as "tree pose" and "down dog" are introduced.
3. A *social component*, which has a game-like character, consists of exercises with a partner or in a group. Concepts taught here include cooperation, respect for others, and adaptation into the group.
4. *Imagery techniques and meditation* conclude the session. Through visualization of a safe and calm place, children learn to consciously master entering a relaxed state. For instance, by visualizing an engine that is reducing its speed, children learn to slow their breathing and their thoughts. Children are also taught meditation techniques where they develop an "inner view" to learn to pay attention to their internal emotions as they occur. These visualization techniques can be generalized for use when children experience anxiety at other times during the day.

Approximately 25 % of each session was spent on initial relaxation, 50 % of each session on yoga exercises and group activities, and 25 % of each session on closing visualization/meditation time. Students received the intervention in groups of 7–10 students.

Measures

Teachers

Teachers completed pre- and post-intervention assessments which measure child adaptive behaviors, problem behaviors and classroom attention for each student in a school setting. Pre-intervention assessments were given to the teachers approximately 1 week before the intervention started and then collected upon the beginning of the intervention. Post-intervention assessments were given to teachers at the end of the yoga intervention and then collected 1 week later. Teacher assessments are as follows:

1. *Behavior Assessment Scale for Children, Second Edition Teacher Rating Scale-Child* (BASC-2 TRS-C). The BASC-2 has been shown to have adequate reliability and validity based on concurrence with similar scales such as the Child Behavior Checklist (CBCL) and Conner's Rating Scales-Revised (CRS-R; Reynolds and Kamphaus 1992). The teacher version of the BASC-2 for children aged 6–11 years contains 139 items and takes approximately 10–20 min to complete. The items describe specific behaviors that are rated on a four-point frequency scale, ranging from "Never" to "Almost Always" (Reynolds and Kamphaus 1992). Subscales include anxiety, aggression, attention problems, hyperactivity, conduct problems, depression, withdrawal and social skills. The five composite scores for the teacher rating scale are the externalizing problems composite, internalizing problems composite, behavioral symptoms index, adaptive skills composite, and school problems composite. For all composites, except adaptive skills, a higher score indicates greater impairment.
2. *The Swanson, Kotkin, Agler, M-Flynn and Pelham Rating Scale* (*SKAMP*) The SKAMP is a validated teacher observation assessment rating scale composed of 10 items, divided into classroom deportment and attention scales (Wigal et al. 1998) that predict social constructs and test-based academic achievement (McBurnett et al. 1997). It has been shown to be reliable and valid in a large, diverse community sample; moreover, it has been validated based on concurrence with questionnaires such as the Swanson, Nolan, and Pelham-IV (SNAP-IV; Murray et al. 2009). The SKAMP has been shown to be sensitive to change (Collet et al. 2003; Wigal et al. 1998). The six attention items (getting started, staying on task, attending to an activity, making activity transitions, completing assigned tasks, and performing work accurately and neatly) and four deportment items (interacting with other children, interacting with adults, remaining quiet, and staying seated) are rated on a 4-point frequency scale (0 = not at all, 3 = very much). A higher score indicates greater symptomatology.
3. *Satisfaction with Intervention* Teachers completed a Satisfaction with Intervention questionnaire once after the intervention as part of the post-intervention assessment. This questionnaire, which had been developed during a previous study, includes 4 open-ended questions and 15 questions on a 5-point rating scale. Teachers rate specific parts of the intervention like scheduling and communication with the yoga team. They also rate how helpful they thought the intervention was on a 5-point rating scale (1 = helpful, 5 = unhelpful).

Parents

Parents completed the following pre-intervention and post-intervention assessments that measure child adaptive and problem behaviors in the community and home setting. Parents also provided background information on their child and treatment they had received or were receiving. Pre-intervention assessments were first sent home to the parents 2 weeks before the intervention began and post-intervention assessments were sent home at the end of the yoga intervention. Assessments were sent home in the child's backpack and parents were contacted weekly with reminders to return completed assessments for up to 1.5 months after the packets were handed out. If the parent did not receive the packet after sending it home twice in the

child's backpack, an assessment packet was sent home in the mail. If a parent had not sent in a packet 1 month after receiving it, it was counted as missing data. The parent assessments are as follows:

1. *Behavior Assessment Scale for Children, Second Edition Parent Rating Scale—Child* (*BASC-2 PRS-C*) The BASC-2 has been shown to have adequate reliability and validity based on concurrence with similar scales such as the Child Behavior Checklist (CBCL) and Conner's Rating Scales-Revised (CRS-R; Reynolds and Kamphaus 1992). The parent version of the BASC-2 for children aged 6–11 years contains 160 items and takes approximately 20 min to complete. The items describe specific behaviors that are rated on a four-point frequency scale, ranging from "Never" to "Almost Always" (Reynolds and Kamphaus 2004). Subscales include anxiety, aggression, attention problems, hyperactivity, conduct problems, depression, withdrawal and social skills. The four composite scores for the parent rating scale are the externalizing problems composite, internalizing problems composite, behavioral symptoms index, and adaptive skills composite. For all composites, except adaptive skills, an increased score indicates greater impairment.
2. *The Background Information Questionnaire* This parent-report questionnaire was created for our earlier school-based studies. It includes demographic information and treatment history for the child's emotional and behavioral disorder symptoms. The questionnaire was given out once at baseline.
3. The *Satisfaction with Intervention* questionnaire measures parent satisfaction with the intervention. This questionnaire, which had been developed during a previous study, includes three open-ended questions and two questions on a rating scale. Parents rated specific parts of the intervention like scheduling and communication with the yoga team. They also rated how helpful they thought the intervention was on a 5-point rating scale (1 = helpful, 5 = unhelpful). The questionnaire was given out once after the intervention for feedback.

Students

Students completed the pencil and paper self-reports 1 week before the intervention began and 1 week after the intervention ended. The assessments were administered during school time by the yoga staff in small groups of two to three children. Assessments include:

1. The *State-Trait Anxiety Inventory for Children* (STAIC) is a self-report instrument consisting of two 20 item self-report scales developed as a research tool for the study of anxiety in elementary school children that measures transitory subjective feelings of anxiety. It has been normed and validated for fourth, fifth, and sixth graders (Spielberger 2009; Walker et al. 1999). One scale measures state anxiety (S-anxiety) and the other trait anxiety (T-anxiety). The S-Anxiety scale consists of twenty items that describe how respondents feel "right now," and the T-Anxiety scale consists of twenty statements that describe how respondents usually feel. For both scales, a larger score indicates greater anxiety symptoms.
2. The *Kidscreen-27* is a 27 question self-report of child well-being, which has been validated and standardized for children between 8 and 18 years of age (Ravens-Sieberer et al. 2007). The scale measures health related quality of life on different items such as physical well-being (e.g.,."[h]ave you felt full of energy?), psychological well-being (e.g. "[h]ave you been in a good mood?"), parent relations and autonomy (e.g. "[h]ave your parents had enough time for you?"), social support and peers (e.g. "[h]ave you spent time with your friends?"), and school environment (e.g. "[h]ave you got along well with your teachers?"). A lower score indicates greater impairment.
3. The *BarOn Emotional Quotient Inventory Youth Version* (*BARON-EQiv:YV*) is a 60 item self-report designed to measure emotional competence (e.g. "It is easy to tell people how I feel"), social competence (e.g. "I can tell when one of my close friends is unhappy"), management of emotions (e.g., "I get too upset about things") and problem solving (e.g., "I can come up with good answers to hard questions"), that has been normed and validated in children and adolescents 7–18 years of age (Bar-On and Parker 2000). A lower score indicates more impairment.
4. The *Satisfaction with Intervention* questionnaire measures parent satisfaction with the intervention for participants to fill out. It includes two open-ended responses and six questions on a rating scale. Children rated the intervention on various aspects like the length of the sessions and how helpful they thought the exercises were on a 5-point rating scale. They also answered open ended questions where they could include additional comments that may have not have been addressed in the questionnaire.

Yoga Instructors

Yoga instructors completed the *Session Attendance, Engagement and Behavior Checklist*. This checklist tracks attendance of participants, noting students' absences along with their excuses. Time spent on each component of the

yoga curriculum (relaxation, yoga exercises, social or group activities, and visualization/meditation) is also tracked. Finally group dynamics for each component were noted using three categories, engagement, medium engagement, or need for redirection.

Analyses

Descriptive statistics were calculated for demographic variables and for baseline data. Dependent samples t-tests were used to analyze changes in off-task behaviors during sessions and scores on each outcome measure. As this was a pilot study with a small sample, we adopted a Type I error rate of .05 and did not adjust it for multiple tests. Due to the small sample size we did not control for any additional treatments or for demographic variables.

Results

Over 2 years, 74 different children were identified by the teaching staff and the special education director as having emotional and behavioral disorders including: anxiety, depression, aggression, conduct disorder, hyperactivity and attention difficulties. A total of 41 children enrolled. Four did not complete the intervention (two because of parental concerns regarding loss of classroom time, one with a diagnosis on the autism spectrum who was unable to participate meaningfully and distracted other participants during the yoga sessions, and one requested not to continue the sessions). Three children were eligible and enrolled in fourth grade and again in fifth grade. Results from the three students were included from both years as they were identified again during the enrollment the second year using the same procedure as for the first year. We included them as the goal of the project was to assess the feasibility of running yoga in this very stressed urban setting, so all students who met the eligibility criteria were accepted. The majority of families with students that did not participate were families with whom we could not get in touch. Many of the phone numbers and addresses logged in the school records were no longer current or working. Approximately half of children who did not participate had nonworking home phone numbers or no phone number listed, and another third of the participants' families did not answer repeated phone calls and messages. About a fourth of the non participating families expressed interest but did not send forms back. We were unable to make any contact with 80 % of the non-participating students' families either because of an incorrect phone number or no answer, thus we do not know why they did not participate. The final analyses included 37 students with EBD. Sample characteristics are reported in Tables 1 and 2.

Table 1 Sample characteristics

Age	M = 10.4 years (SD = 0.82)
Male gender	58.5 %
Race[a]	
Asian-American	4.9 %
African-American	48.8 %
Caucasian	19.5 %
Native American	12.2 %
Hispanic Ethnicity	24.4 %
Languages spoken at home[a]	
English	73.2 %
Spanish	14.6 %
Cape Verde	2.4 %
Cambodian	4.9 %
Portuguese	4.9 %
Creole	2.4 %

[a] Participants may report more than one race or language spoken at home

Table 2 Participant Diagnoses[a]

Attention problems—ADHD	9.8 %
Depression/bipolar disorder	9.8 %
Anxiety/obsessive–compulsive disorder	19.5 %
Schizophrenia	2.4 %
Behavior problems	24.4 %
Social problems	9.8 %
Autism spectrum disorder	24.4 %
Neurological problems/seizures	7.3 %
Birth defects	4.9 %
Tics	2.4 %
School problems, speech and language problems, reading difficulties	58.5 %
Other	12.2 %

[a] Participants may report more than one diagnosis

Feasibility

The study supported the feasibility of offering yoga-based interventions in a school setting. The research team developed a close relationship with the school staff over the year of preparation leading up to the enrollment and intervention phases of the project. Frequent interactions with the school staff ensured smooth execution of the yoga sessions. The participants, elementary school students in a disadvantaged urban school district, were motivated to learn new skills and the average attendance was around 90 % as calculated from the Session Attendance, Engagement and Behavior checklist.

Feasibility of hour-long yoga sessions outside of the classroom environment during the school day was

supported. Over the 2 year period, the research staff worked closely with the students' teachers regarding yoga session scheduling, which was considered important by school staff. Although the sessions were administered to challenging groups of students with EBD, the classes were feasible and did not require outside disciplinary action.

Fidelity was ensured in a number of ways. All yoga instructors were experienced in leading yoga sessions for children in schools and followed the Yoga Ed curricula. Instructors successfully completed the Session Attendance, Engagement and Behavior Checklists that included detailed information about each session, content covered, attendance, as well as individual and group compliance. The head yoga instructor systematically reviewed the sessions on a weekly basis with the other yoga instructors and discussed challenges during the sessions.

We were successful in eliciting full engagement and participation of this challenging group of students with EBD. Yoga instructors asked students to sit on the side when they were not participating and encouraged them to rejoin the group when they were ready. Engagement was recorded by the yoga instructors on the Session Attendance, Engagement and Behavior Checklists each yoga session. Students were engaged for the majority (78 %) of poses.

Satisfaction with Intervention

Satisfaction with intervention questionnaires were distributed to teachers, participants, and parents once at the end of the intervention. Satisfaction response rates were 100 % for teachers, 62 % for parents, and 100 % for students. Only one participant out of the 41 did not want to continue the sessions and requested to drop out.

Data from the satisfaction questionnaires yielded the following information. In general parents, teachers and students reported satisfaction with their child or student's participation in the Yoga Project. Of teacher responses, the majority of comments were positive. Sixty-four percent (64 %) of teachers requested the continuation of the Yoga Project or yoga poses for their students' future use, or reported strong praise for the Yoga Team. Sixty-three percent (63 %) of the negative teacher comments can be attributed to concerns about scheduling (e.g., "[s]tudents missed a lot and were behind" and "[s]cheduling conflicted with academics"). The majority of teachers reported their students enjoyed yoga with comments such as "[i]t helped them relax so that they could concentrate" and "really enjoyed the yoga poses—made them feel calm."

The majority of parent responses (72 %) reported positive changes in their children, including increased calm and relaxation, increased happiness and/or increased energy. Thirteen percent (13 %) of parents also noted an increase in helping or positive behaviors performed by their child, in addition to improvement in their child's attitude. Examples of parents' comments included "[k]eep doing it, it helps a lot with attitudes and emotions," and "[h]e has changed a lot for the better."

Of participant comments, the vast majority were positive or neutral; only 11 % of participant responses were negative. Nine of the 37 participants reported physical improvements (e.g., increased strength). Forty-two percent (42 %) of the relevant comments reported an increase in calm and relaxation, increased happiness and/or increased energy. Nine of the participants simply responded "Yes!" to the question, "Was yoga helpful?" Others responded with comments such as "because it was easy to relax" and "because I'm having behavior problems anyway, so I decided to take yoga. And it helped."

Efficacy

The change pre- to post-intervention was analyzed for each measure. Eighty-three percent (83 %) of parent questionnaires were returned for the pre-intervention assessment and 62 % for the post-intervention assessment. All (100 %) of child assessments were returned at both pre-assessment and post-assessment time points. Ninety-eight percent (98 %) of teacher assessments were returned during the pre-intervention assessment and 100 % during the post-intervention assessments. No child took part in the yoga sessions without the Informed Consent Form being signed by a parent. There were no statistical differences in the demographic characteristics of families who turned in questionnaires only during the pre-assessment and those that turned in the questionnaires during both the pre-assessment and post-assessment time points.

Classroom Teacher Data

For each participant, teachers completed the Behavior Assessment Scale for Children, Second Edition (BASC-2) to assess behavior symptoms and the Swanson, Kotkin, Agler, M-Flynn & Pelham Rating Scale (SKAMP) to assess classroom deportment and attention pre- and post-intervention. A return rate of 97 % for teacher data on these questionnaires rendered a reliable dataset. BASC-2 data reported significant improvement on the Internalizing Problems Composite ($p = 0.04$), Behavioral Symptoms Index ($p = 0.01$) and Adaptive Skills Composite ($p = 0.03$) and a trend ($p < 0.3$) toward significant improvement on the School Problems and Externalizing Problems composites. SKAMP data showed significant improvement on the Classroom Attention Symptoms sub score ($p = 0.009$) and the Total Score ($p = 0.02$). Effect sizes for significant measures were small to moderate (see Table 3).

Table 3 Pre–post effects teacher assessments

Measure	Mean		T-Score	*df*	Effect Size
	Time 1	Time 2			
T-SKAMP Score					
Classroom Attention Symptoms Subscore	14.28 (5.34)	12.33 (5.03)	2.76	35.00	−0.38**
Classroom Deportment Subscore	7.75 (3.43)	6.97 (2.92)	1.60	35.00	−0.24
Total Score	22.03 (8.15)	19.31 (7.25)	2.57	35.00	−0.35**
BASC-2 Composites					
Externalizing Problems Composite	58.12 (15.62)	56.64 (11.72)	0.76	32.00	−0.11
Internalizing Problems Composite	58.50 (11.72)	55.75 (8.56)	1.76	31.00	−0.27**
Behavioral Symptoms Index	61.41 (14.02)	57.91 (10.53)	2.29	31.00	−0.29**
Adaptive Skills Composite	44.06 (8.83)	47.03 (8.35)	−1.94	31.00	0.35**
School Problems Composite	55.76 (8.91)	54.42 (9.03)	1.92	32.00	−0.15

Standard deviations in parenthesis

Negative effect size = score decrease, positive effect size = score increase

For all measures, except the BASC-II adaptive skills composite, a higher score indicates greater impairment

* $p < 0.10$; ** $p < 0.05$

Table 4 Pre–post effects parent assessments

Measure	Mean		T-Score	*df*	Effect Size
	Time 1	Time 2			
BASC-2 Composites					
Externalizing Problems Composite	49.86 (2.21)	53.05 (3.36)	−1.24	20.00	1.15
Internalizing Problems Composite	52.60 (2.81)	53.20 (3.07)	−0.33	19.00	0.20
Behavioral Symptoms Index	54.24 (2.61)	54.62 (2.97)	−0.18	20.00	0.14
Adaptive Skills Composite	44.05 (2.18)	44.74 (2.43)	−0.34	18.00	0.30

Standard deviations in parenthesis

Negative effect size = score decrease, positive effect size = score increase

For all measures, except BASC-II Adaptive Skills Composite, a higher score indicates greater impairment

* $p < 0.10$; ** $p < 0.05$

Parent Data

The return rate of parent questionnaires was low during the post-intervention assessment at 62 %, yielding a relatively incomplete dataset compared to the teacher and child response rate. No significant results were found (see Table 4).

Student Data

There was a 100 % return rate of pencil and paper self-reports of state-trait anxiety symptoms (STAIC), quality of life (KIDSCREEN-27), and emotional intelligence (BARON-EQiv:YV). Participants reported a significant increase in state anxiety ($p = 0.005$). No other significant results were found (see Table 5).

Discussion

It is estimated that 12–13 % of school aged children in the U.S. suffer from EBD with at least moderate impairment (Forness et al. 2011; Merikangas et al. 2010). Negative outcomes such as poor grades, poor personal relationships, failure to complete high school, unemployment, incarceration, substance abuse, and suicide are associated with untreated emotional and behavioral disorders (Jack et al. 2004). School-aged children presenting with challenging emotional and behavioral problems that may be resistant to traditional approaches that have been the trademark of special education interventions (Smith et al. 2011). Yoga is a common practice throughout the U.S. for adults and its popularity is increasing in the pediatric population. The National Health Statistics Report indicates that 6 % of

Table 5 Pre–post effects child assessments

Measure	Mean		T-Score	*df*	Effect size
	Time 1	Time 2			
State-Trait Anxiety Inventory for Children (*STAIC*)					
State Anxiety	28.86 (6.04)	32.53 (7.16)	−2.96	35.00	0.56**
Trait Anxiety	36.70 (8.15)	39.03 (5.69)	−1.61	36.00	0.34
KIDSCREEN-27 (*Quality of Life*)					
Kidscreen Sum Total	99.03 (15.85)	96.60 (17.11)	1.07	36.00	−0.15
BarOn EQ-I: *YV* (*S*) (*Emotional Quotient*)					
Total Emotional Quotient T-Score	100.95 (17.29)	98.60 (16.27)	0.77	36.00	−0.14

Standard deviations in parenthesis

Negative effect size = score decrease, positive effect size = score increase

For the STAIC, a greater score indicates greater impairment

For the KIDSCREEN-27 and the BarON EQ-I: YV (S), a higher score indicates lower impairment

* $p < 0.10$; ** $p < 0.05$

children practice yoga (Barnes et al. 2008). The components of traditional yoga generally include calm breathing, postures, and meditation. Children with a range of disabilities may benefit from learning these techniques, as yoga may enable them to increase awareness of their emotional state through practical and well-rehearsed techniques (Carthy et al., 2010; Peck 2005). Yoga has been found to promote relaxation and greater self-awareness, self-control and concentration among children with a variety of physical diagnoses such as epilepsy, asthma, and irritable bowel syndrome (Krusche 1999; Kuttner et al. 2006; Sirven 2003). We propose to support children with EBD through yoga training, a multimodal form of exercise that helps children (and adults) overcome stress and maximize their performance (Grossman et al. 2003; Kabat-Zinn et al. 1992). Our study aimed at delivering yoga sessions within an urban school setting to children with emotional and behavioral disorders to assess feasibility and potential positive effects on classroom attention and behavior.

Average attendance for the yoga sessions was 90 %. Eighty percent of responders described being very satisfied with the intervention. Teachers reported improved attention in class ($p = 0.01$) and adaptive skills ($p = 0.03$) and reduced depressive symptoms ($p = 0.03$), behavioral symptoms ($p = 0.01$), and internalizing symptoms ($p = 0.04$). No significant changes were found in the parent data and no discernable trend was found in student reports. As hypothesized, these results demonstrate that implementing yoga interventions in school settings is feasible, although it requires intense coordination with the school team. The intervention was well accepted by teachers, parents, and participants. Buy in from the school level was very high even though it was challenging to pull the students out of their classrooms twice a week. The school recognizes that they need help with this specific population of students.

Feasibility was challenging due to the demanding behaviors of participants with EBD. Children with EBD are faced with significant behavioral, social, and academic challenges which begin in early elementary school and continue throughout their educational career. Traditional classroom behavior management interventions may be insufficient or ineffective for students with EBD and many teachers feel unprepared to support these students. Yoga in small groups for students with EBD could be an adjunctive and innovative approach to support these students. Disciplinary difficulties were handled successfully within sessions and no additional disciplinary actions were required. Decreased disciplinary issues and high motivation of the students towards the sessions might also reflect the importance of having trained yoga instructors. We found that small groups of 7-10 students are optimal for yoga instruction for EBD students in this age group.

The school setting optimizes interventional delivery of yoga sessions because children spend a significant amount of their time in school, where some also receive mental health services. However, feasibility is challenging from multiple perspectives. Selection of a participating school can be complex, as it is imperative to have "school buy in" at the principal and teacher level so that they are prepared to work with yoga instructors in order for the intervention to be successful. In our case, the school was very willing to collaborate to support their students with emotional and behavioral disorders. In addition as children are pulled out of class, scheduling was complicated. Despite these challenges, classroom teachers were enthusiastic about the project as the intervention progressed. The school administration was also engaged in the yoga intervention and invited our head yoga instructor to return for a 1-week yoga introductory course, exposing grades two to four to yoga sessions. Anonymous feedback questionnaires from

classroom teachers for this introductory course that took place after our pilot study was completed showed that (1) their students enjoyed the course (2) the information provided by the instructor was very helpful and (3) they would like to include yoga in their future classroom schedule. Even after this short exposure, 60 % of teachers indicated that they plan to use the information in their classrooms "after lunch," "when they [students] call out," and "when students need to relax their bodies."

Teachers reported that participants in the yoga project experienced statistically significantly improved focus in class as noted by the SKAMP and significantly reduced behavioral symptoms, as noted by subscales of the BASC-2. We did not find any significant results in the parent responses and children reported increased anxiety. Taken in total, the results are ambiguous. It is possible that the teachers were biased because they expected a change, although they were not directly involved in the yoga sessions.

There were a number of additional limitations in our study. Parent response rate was lower compared to student and teacher response rates. Although a return rate of 62 % is acceptable, the lower return rate may be explained in part by methodological problems including (1) many parents did not speak and/or read English; (2) despite our efforts sending reminders there was poor communication between student and parent (e.g., reminders, explanations); (3) families attending this school tend to be highly mobile (4) many contact information cards contained outdated or invalid information as reported by teachers. This yoga study in an urban school setting offered participation to students with EBD from underserved and often stressed families. Enrollment of participants and questionnaire completion from these families is challenging. This population is highly mobile due to many issues including homelessness, foster care, migrant work patterns, poverty, family disruptions, and immigration. Approximately 25 % of U.S. urban third graders are found to be highly mobile compared to only one-seventh of suburban and rural students (U.S. Government Accountability Office 1994).

Students reported some increased state anxiety as shown on the STAIC. It is possible that the testing was confounded by events occurring in the school. The first year of the intervention, the school was quarantined due to an H1N1 outbreak and formally shut down by the school health committee for a week before post-intervention testing was administered. The second year students were completing state-wide mandatory standardized testing during the post-intervention assessment. Both of these circumstances could have led to higher state anxiety. In addition, although the measures were validated for children ages 8–11, they revealed to be developmentally too complex for this group of students, who were English speaking, yet their language level was lower than would be estimated for their grade level. Many students had difficulty reading the questionnaires, and had multiple questions as regards to phrasing. Research assistants noted that there were many vocabulary words that the children were unable to understand. Moreover, the students made comments that showed they were confused by the reverse questions.

This is a small pilot study and therefore lacks sufficient power to explore the results in detail. One of the limitations was our assessment strategy which was challenging for parents and children to complete. In future work it will be necessary to review the instruments in order to achieve more consistent results. The sample, representing primarily an urban disadvantaged community, is not representative of the general population of students of this age group.

This study provides preliminary evidence for the feasibility and possible effectiveness of yoga intervention to support children with emotional and behavioral disorders in an urban school setting. These results demonstrate the need for a large, randomized control trial of yoga-based interventions in schools. Such a study should include a larger sample and include careful assessments of the effects of the treatments on classroom behavior and academic performance. Although teachers, parents, and students filled out a Satisfaction with Intervention questionnaire, interviews and focus groups were not conducted. **A** future study would benefit by conducing focus groups. Future studies should include long-term follow-up assessments to evaluate whether gains attributable to treatment are maintained over time.

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