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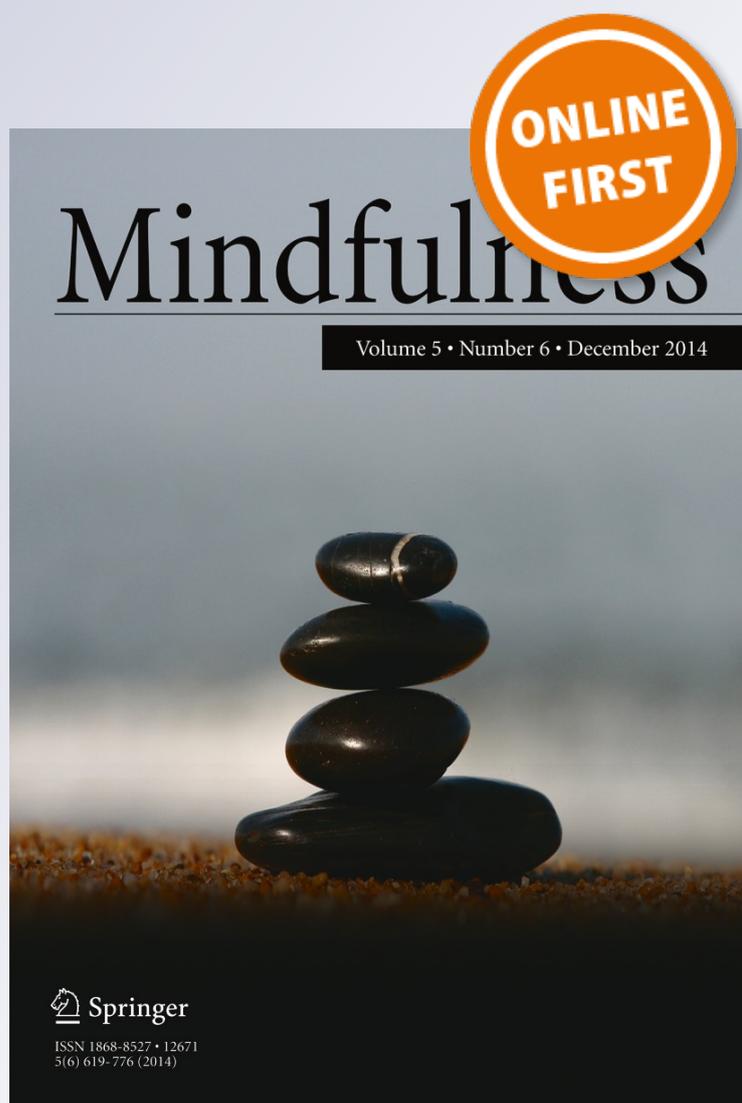
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# A School-Based Mindfulness Pilot Study for Ethnically Diverse At-Risk Adolescents

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**Abstract** Adolescence is a critical period for intervention with at-risk youth to promote emotional well-being, deter problematic behavior, and prevent the onset of life-long challenges. Despite preliminary evidence supporting mindfulness interventions for at-risk youth, few studies have included implementation details or reported feasibility and acceptance in ethnically diverse at-risk adolescents in a school setting. We conducted a randomized pilot study of a school-based mindfulness program, Learning to BREATHE, with ethnically diverse at-risk adolescents. Twenty-seven students were randomly assigned to a mindfulness or substance abuse control class that occurred for 50 min, once a week, over one school semester. Adjustments were made to increase acceptability of the mindfulness class, including enhanced instructor engagement in school activities. Reductions in depression were seen for students in the mindfulness class compared to controls. Initially, students' perceived credibility of the mindfulness class was lower than that of the substance abuse class. Over the semester, perceived credibility of the mindfulness class increased while that of the substance abuse class decreased. Qualitative acceptability measures revealed that the mindfulness class helped to relieve stress and that students favored continuing the class. This study provides practical knowledge

about what works with this unique population in a school setting and offers suggestions for future studies.

**Keywords** Mindfulness · Ethnically diverse · At-risk adolescents · School-based interventions · Feasibility · Psychosocial outcomes

## Introduction

Adolescence is a transitional period marked by rapid physical, behavioral, emotional, and cognitive developmental changes (Blakemore et al. 2009; Divall and Radovick 2008; Paus et al. 2008; Susman and Dorn 2009). In addition to these normative development changes, adolescents also face a multitude of contextual stressors such as academic pressures at school, changing relationships with peers, and all too often, unstable family life characterized by divorce, frequent moves, income and occupational changes, and disruptions in family routines (Forman and Davies 2003). Up to a quarter of adolescents suffer from depression or anxiety disorders, and an even larger proportion struggle with subclinical symptoms (Merikangas et al. 2010). Anxiety and depression during this stage can lead to impaired academic, social, and family functioning, and have long-term adverse outcomes (Johnson and Greenberg 2013).

In addition to the typical developmental stressors of adolescence, at-risk youth frequently confront unique pressures that have been linked to poor psychosocial outcomes, impaired academic performance, and maladaptive behaviors such as substance use and delinquency (McKnight et al. 2002). These risk factors may include language barriers, low SES, parents' own involvement in high-risk or illegal behavior, restrictive or neglectful parenting, and home environments that expose children to alcohol and substance abuse (Boggs and Linnemann 2011). Over time, these stressors accumulate

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further amplifying poor psychological outcomes (Greenwood et al. 2004; Lovallo 2001; McEwan 2008; McKenry and Price 2005). For example, a 2008 study reported that urban Hispanic adolescents have higher levels of depression compared to other ethnic groups and are more likely to be retained a grade (Robles-Pina et al. 2005). Research suggests that chronic or repeated exposure to stress has enduring effects on the brain, which can negatively impair memory and increase the likelihood of generalized anxiety, panic, and major depressive disorders during adulthood (Keenan et al. 2008; Lupien et al. 2009; Pine et al. 1999). Therefore, adolescence is a critical period to intervene by teaching stress reduction skills, in order to prevent the onset of emotional, cognitive, and social problems that can persist into adulthood (S. J. Blakemore and Mills 2014).

Researchers have begun to examine mindfulness as a potential intervention for helping adolescents to maneuver the turbulence often associated with this developmental stage. Studies of mindfulness interventions in adult populations have generally shown decreased stress and improvements in psychological and physical health outcomes (Greeson 2009; Khoury et al. 2013). Despite the large number of studies on adults, studies of mindfulness interventions in adolescent populations are more limited, especially for populations of at-risk youth. Existing reviews of mindfulness interventions (Burke 2010) and sitting meditation practices (Black et al. 2009) with youth indicate that these programs have potential for promoting positive changes. Likewise, a recent meta-analysis on mindfulness interventions with youth confirms this finding, particularly in relation to psychological outcomes, such as depression and anxiety (Zoogman et al. 2014).

The available studies examining the feasibility and acceptability of mindfulness-based interventions for at-risk adolescents have shown promising results. Interventions have been implemented in a range of settings, including homeless shelters (Grabbe et al. 2012), juvenile detention centers (Himmelstein 2011; Himmelstein et al. 2014; Leonard et al. 2013), outpatient clinics (Britton et al. 2010; Kerrigan et al. 2011; Sibinga et al. 2011), and schools (Sibinga et al. 2013). In particular, incarcerated youth who had previously shown resistance to other psychological interventions were more accepting of a mindfulness-based program and found it to be meaningful, educational, and beneficial (Himmelstein 2011, 2012). Acceptance of this intervention appeared to be related to the development of trust, enhancement of positive emotions, and reduction of stress within the group over the course of the mindfulness program (Himmelstein 2012). In another at-risk youth population, HIV-infected African-American patients identified five overarching themes which defined their experience with the program. These themes supported feasibility and included improved attitude, decreased reactivity, improved behavior and self-care, and importance of group cohesion and safety (Sibinga et al. 2008).

In addition to feasibility and acceptability findings, positive psychosocial outcomes have also been reported in studies with at-risk youth. These outcomes include decreases in rumination (Sibinga et al. 2013), anxiety (Grabbe et al. 2012; Sibinga et al. 2013), depression (Grabbe et al. 2012), hostility (Sibinga et al. 2011), negative coping (Sibinga et al. 2013), intrusive thoughts, emotional arousal, and stress (Himmelstein 2011; Sibinga et al. 2011). Further, improvements were reported in interpersonal relationships (Sibinga et al. 2011), mental wellness and psychological resilience (Grabbe et al. 2012), self-regulation (Himmelstein 2011), functional attention (Leonard et al. 2013), and self-efficacy (Britton et al. 2010; Sibinga et al. 2008).

Despite preliminary evidence supporting mindfulness interventions with at-risk youth, few studies have illuminated the details of *how* to implement these programs. In other words, what specific factors increase the feasibility of a mindfulness program? What adjustments or adaptations would allow a mindfulness program to be more acceptable to this unique population? Furthermore, we found no studies that explored the feasibility and acceptability of mindfulness-based interventions in an ethnically diverse population in an alternative high school setting, especially for Hispanic students.

Given the need to better understand both the implementation and potential benefit of mindfulness programs for at-risk youth, we conducted a randomized pilot study to investigate the feasibility and acceptability of such an intervention with ethnically diverse, primarily Hispanic youth enrolled in an alternative high school. We specifically examined intervention effects on psychosocial well-being relative to the control group, a class which focused on substance abuse prevention. We also provide suggestions for tailoring a program for this specific population of adolescents, based on feedback from the students themselves.

## Method

### Participants

The study was conducted at an alternative high school in North Carolina for students in grades 9-12. The school serves high-risk adolescents who have struggled academically within the traditional public high school setting. Students were either parent-referred or referred by the administration of their original public high school to the alternative school. During the study period of the spring, 2014 semester, 33 students (73 % male) were enrolled in the high school. The school's population was racially/ethnically diverse (54 % Hispanic, 24 % African-American, 18 % Caucasian, 3 % other) and primarily low income (i.e., 88 % received a free or reduced lunch). Out of the 33 students, 40 % were court involved,

67 % had prior suspensions, 24 % utilized mental health support, 87 % (out of 32 students) were failing  $\geq 1$  class in their original high school, and 18 % were parenting a child or currently pregnant. The inclusion criteria for students at the school to participate in the study required (1) English language proficiency because classes and assessments were delivered in English and (2) participation in the school's Navigational class period. The navigational class was a weekly 50-min class period allotted for specific training in life skills (e.g., small business start-up, robotics, managing finances) which varied each semester. The study was approved by the University of North Carolina at Chapel Hill's Institutional Review Board and the local school district office of testing and research. We received parental/guardian consent and student assent prior to study enrollment.

### Procedure

After informed consent and assent were obtained, the students completed the online baseline assessment at the high school during a day and time period organized by the school administrators. After completion of the baseline assessment, students were randomly assigned by computer program to one of two programs offered during the Navigational period (mindfulness and substance abuse prevention). The substance abuse class served as the study's control. Students who were absent at the baseline assessment completed their assessment prior to beginning their first Navigational class (i.e., mindfulness or control class). The final assessment was completed within a week following the 11th (last) class. Students who were absent for the final assessment were tracked, and research staff returned to the school over the next 2 weeks to complete the assessment.

*Mindfulness Intervention* Learning to BREATHE (L2B) is a mindfulness curriculum that has been created for an adolescent population (Broderick 2013). Based on themes and practices used in mindfulness-based stress reduction (MBSR; Kabat-Zinn 1990), it uses developmentally appropriate hands-on activities and guided discussions to teach standard mindfulness skills, including the body scan, sitting meditation, lovingkindness practice, walking meditation, and mindful movement. It is guided by six themes, each represented by a letter in the acronym "BREATHE": Body, Reflections (thoughts), Emotions, Attention, Tenderness, and Healthy habits. It is generally taught in 6 hour-long classes or 18 20-min classes but has been adapted to fit into other formats to accommodate the needs of the educational setting where it is being offered. Previous studies which implemented Learning to BREATHE in public and private high schools reported positive findings, including decreased stress and somatic symptoms (Broderick and Metz 2009; Metz et al. 2013); however, the present study is the first implementation

of Learning to BREATHE in a school specifically for at-risk students.

In this study, the curriculum was modified to accommodate the logistical demands of the school and the unique needs of the population. The instructor (Bluth) of the classes was an experienced mindfulness practitioner (35 years), and a mindfulness instructor of 3 years, who had previously taught L2B in several different community and school settings. In addition, she had been a classroom teacher for 18 years. Curriculum modifications related to content and presentation were made with the consult of the curriculum's author (Broderick). For example, this course was presented over 11 classes, rather than 6 60-min or 18 20-min classes. The first three classes were held in the math classroom, and the L2B curriculum was followed with minimal modification. Short adaptations of the body scan were introduced while students remained in their seats. At the fourth class, the location of the classes was changed to the far end of the gym, with no presence of other students or teachers in the gym. Students reclined on yoga mats in comfortable positions, often with a pillow or two under their head or knees, and the full length body scan was introduced. After this, all classes were held in this gym area and began with a 20-min period of either a body scan or restorative yoga, a type of yoga in which positions are held for long stretches of time and the body is supported by bolsters and cushions, with the goal to achieve a state of deep relaxation. When the yoga was practiced, soft, relaxing music was played in the background and students were instructed to pay attention to sound by maintaining attention to the tones of the music. If they noticed their mind had drifted at any point or they were aware of thoughts arising, they were instructed to gently guide their attention back to the sounds. Although yoga is included in the L2B curriculum, restorative yoga is not. We felt that restorative yoga helped the students to relax and provided a greater sense of safety, which seemed to be essential for these students. If a body scan was used, instructions were similar to that of an adult body scan. Both mindfulness of sound and the body scan are integral to L2B; however, in this implementation, these techniques were used more frequently and adapted to the students' needs.

After the 20-min period of the body scan or restorative yoga, activities were included from the Learning to BREATHE curriculum. The classes focused on the following: (1) classes 1 through 4 incorporated activities from sections on mindfulness of the body, (2) classes 5 through 7 included activities related to mindfulness of thoughts, (3) class 8 focused on mindfulness of emotions, (4) class 9 included exercises on attention, and (5) class 10 focused on tenderness or lovingkindness. In the final class (class 11), walking meditation was introduced and the students discussed their overall opinion of the program, as well as specific ways to continue implementing what they had learned throughout the summer months.

*Active Control* The active control was an evidence-based substance abuse class designed to help adolescents address drug use and co-occurring life problems (Stevens et al. 2007; Smith et al. 2006). The high school administrators had elected to include this class as the other Navigational period class because drug use was a substantial issue among the students. The sessions were held in a group format, utilized didactic instruction (no physical activities), and the content of the sessions followed the curriculum and were adjusted to meet the needs of the students. For example, more trust-building activities were included in the early weeks of the program. The control group was held on the same day and time as the intervention class, and similar to the intervention class, the instructors were not school employees. Additionally, the instructors had taught a Navigational class at the school in the prior semester. The instructors had education degrees and were experienced social workers.

## Measures

*Feasibility and Acceptability* To assess feasibility and acceptability, we collected study enrollment and retention data, class attendance data at each session, and measures of students' acceptability. Class attendance rate was calculated for students who remained enrolled at the school during the entire semester (# attended classes/# total potential classes), and we assessed the proportion of those who attended >5, >8, or all 11 classes. To measure acceptability of the assigned class, we implemented the credibility scale (Borkovec and Nau 1972) after the second class, the sixth class, and the final class (scale details below). The Borkovec and Nau credibility scale measures the degree to which participants believe that their intervention is credible and effective in improving outcomes. This was implemented after the second class, rather than after the first class, to ensure that the students had an understanding of what the class would entail. This 5-item scale assesses expectations of the assigned class's benefit and the perceived value of the class. For this study, the instructions were stated as, "You've had [two classes, a few classes so far, or have completed the class] and we are interested in getting your impressions of your experience of the class thus far". Sample questions included "How much does what's being taught in this class make sense to you in helping you to deal with teen issues?" and "How important do you think it is that we make this class available to other teens?" Responses were indicated with a 9-point Likert scale of 0 (not at all) to 9 (very). The potential total score range is 0 to 45; higher scores indicate higher perceived credibility of the class. The scale's average Cronbach's reliability was  $\alpha=0.87$ . The mindfulness classes were audio-recorded initially to assess fidelity to the program; post hoc, transcriptions of these audio-recorded classes were used to obtain qualitative data to inform acceptability of the L2B program. After each class, the instructor took field notes

indicating her reflections of the class. The control class was not audio-recorded.

To assess psychosocial well-being, online assessments were completed at baseline and post-intervention (i.e., 1 week after the final class) and are described below.

*Mindfulness* The Child and Adolescent Mindfulness Measure (CAMM; Greco et al. 2011) is a 10-item measure of children/adolescents' mindfulness skills (present-moment awareness and non-judgmental, non-avoidant response to thoughts and feelings). Responses are indicated with a 5-point Likert scale ranging from 0 (never true) to 4 (always true). Reported reliability is Cronbach's  $\alpha=0.82$  (Greco et al. 2011). The possible score range is 0 to 40, with higher scores indicating more mindfulness.

*Self-Compassion* The Self-Compassion Scale-Short Form (SCS-SF; Raes et al. 2011) consists of 12 items to assess felt self-compassion through the components of self-kindness, self-judgment (reverse scored), common humanity, social isolation (reversed scored), mindfulness, and over-identification (reverse scored). Responses are indicated with a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). Analysis of the subscales is not recommended because the reliabilities of these are lower than that found in the SCS long-form (Raes et al. 2011). Reported reliability is  $\alpha>0.86$  (Raes et al. 2011). The possible total mean score range is 1 to 5, with higher scores indicative of higher self-compassion.

*Social Connectedness* The Social Connectedness Scale (SOC; Lee and Robbins 1995) is an 8-item scale that assesses the sense of interpersonal connectedness and belongingness. Responses are indicated on a 6-point Likert scale ranging from 1 (agree) to 6 (disagree). Reported reliability is  $\alpha=0.91$  (Lee and Robbins 1995). The potential score range is 8 to 48, with higher scores indicating greater feelings of connectedness.

*Anxiety* The Spielberger State-Trait Anxiety Inventory (STAI) 6-item short form (Martean and Bekker 1992) assesses general anxiety. Responses are indicated with a 4-point Likert scale of 1 (not at all) to 4 (very much). Reported reliability for the short form is  $\alpha=0.82$  (Martean and Bekker 1992). The potential pro-rated score range is 20 to 80, with higher scores indicating greater anxiety.

*Depression* The Short Mood and Feelings Questionnaire (SMFQ; Angold et al. 1995) is a self-report 13-item scale that assesses childhood and adolescent depression. Responses are indicated with a 3-point Likert scale of 0 (not true) to 2 (true). Reported reliability is  $\alpha=0.87$  (Angold et al. 1995). Potential total score range 0–26, with higher scores indicating greater depression.

**Perceived Stress** The 10-item Perceived Stress Scale (PSS; Cohen et al. 1983; S. Cohen and Williamson 1988) assesses how unpredictable, uncontrollable, and overloaded respondents perceive their lives to be. Responses are indicated on a 5-point Likert scale from 0 (never) to 4 (very often). Reported reliability is  $\alpha = 0.91$  (S. Cohen et al. 1983). The potential total score range is 0 to 40; higher scores indicate greater perceived stress.

**Data Analysis**

To compare the classes on their baseline sociodemographics, we used Pearson chi-square tests or Fisher's exact tests (if expected cell count was less than 5) for categorical data and independent *t* tests for continuous data. The students' acceptability of their assigned class (i.e., class credibility scale) was also compared (L2B vs. control class) at the first (after second class), second (after 6th class), and third (after final class) assessment with independent *t* tests. Descriptive data were presented for study enrollment and

retention, and class attendance rates were calculated (# of classes attended/# total potential classes) for the L2B and control classes. For the psychosocial outcomes, we compared the classes on their change scores (final minus baseline) using Mann-Whitney-Wilcoxon tests (due to appreciable skewness in a number of the scales) and calculated effect sizes (Hedge's *g*; i.e., adds a correction factor for small sample sizes) with 95 % confidence intervals. Analyses were conducted with SPSS 20 and statistical significance was set at  $p < 0.05$ , using two-tailed tests. We also interpreted effect sizes (small=0.20, medium=0.50, large=0.80; J. Cohen, 1988) and their associated 95 % confidence intervals as an estimate of precision because statistical reporting guidelines recommend interpreting outcomes with effect sizes rather than *p* values (Cumming 2014; Durlak 2009; Moher et al. 2010). As a small feasibility pilot study, the psychosocial findings were considered as preliminary to help inform the design of a future larger efficacy trial that would include additional at-risk school populations.

**Table 1** Baseline sociodemographic characteristics by groups ( $n=27$ )

	L2B $n=14$ $M$ (SD) or $n$ (%)	Control $n=13$ $M$ (SD) or $n$ (%)	<i>p</i> value
Ages (years)	16.8 (1.3)	17.2 (1.1)	0.42
Male gender	8 (61)	8 (57)	0.82
Ethnicity/race			0.01
African-American	0 (0)	5 (39)	
Non-Hispanic/White	2 (14)	3 (23)	
Hispanic/Latino (a)	11 (79)	4 (31)	
Other <sup>b</sup>	1 (7)	1 (7)	
School grade			0.22
9th	1 (7)	0 (0)	
10th	6 (43)	4 (31)	
11th	6 (43)	4 (31)	
12th	1 (7)	5 (38)	
Mother/female guardian's education level <sup>c</sup>			0.82
≤High school	9 (64)	9 (75)	
Some college/college graduate	4 (29)	2 (17)	
Graduate degree	1 (7)	1 (8)	
Father/male guardian's education level <sup>b</sup>			1.00
≤High school	10 (77)	9 (75)	
Some college/college graduate	1 (8)	1 (8)	
Graduate degree	2 (15)	2 (17)	

Group comparisons were conducted with independent *t* tests for continuous variables and Pearson's chi-squared or Fisher's exact tests for categorical variables with expected cell count <5. A total of 28 students completed the baseline survey; however, one student left the school prior to class assignment, resulting in  $n=27$  for group comparisons

<sup>a</sup> Other race category = Asian, Native Hawaiian, Pacific Islander

<sup>b</sup> Missing *n*: mother/female guardian's education  $n=1$ , father/male guardian's education  $n=2$

**Results**

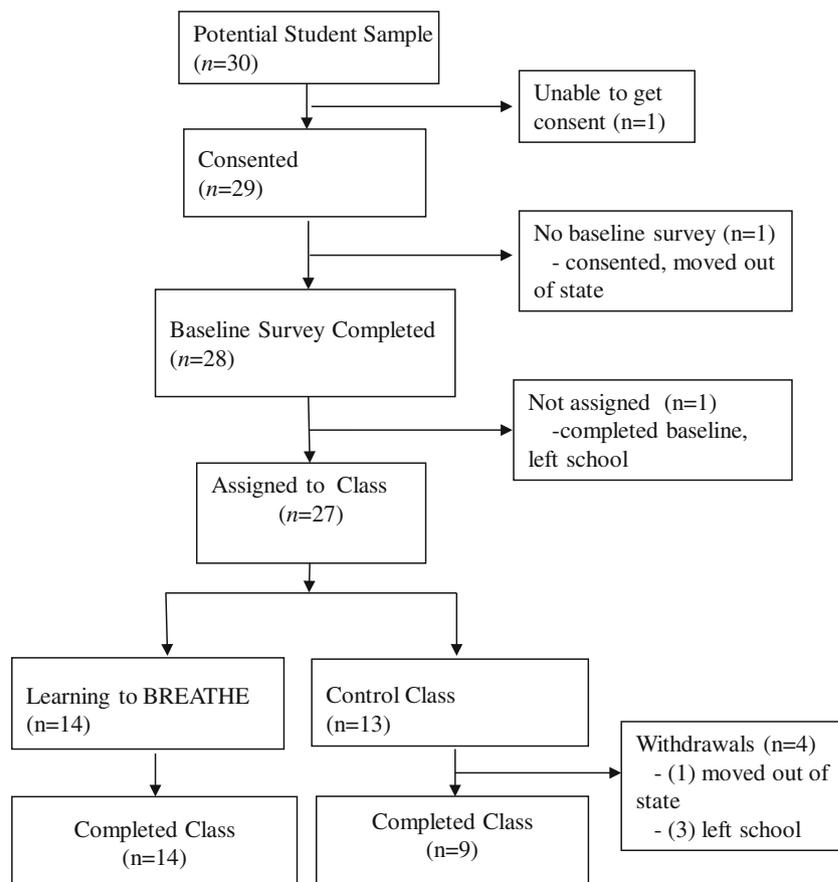
The study participants' average age was 17 years (SD=1.3), 39 % were female, 57 % were Hispanic/Latino, and the majority were in 10th (36 %) and 11th grades (36 %). Baseline sociodemographic characteristics for the L2B and control classes are displayed in Table 1. The L2B class had more Hispanic/Latino students (79 vs. 31 %) and fewer African-American students (0 vs. 39 %) than that of the control class; otherwise the groups were similar on sociodemographic characteristics.

Although 33 students were enrolled in the high school, our starting sample pool consisted of 30 students because students who would not be attending the Navigational class period were not eligible to participate. No students were excluded based on the English language requirement. As shown in the study flow chart (Fig. 1), 29 out of 30 students were consented, 28 students completed the baseline assessment, and 27 students were assigned to the L2B class ( $n=14$ ) or the control class ( $n=13$ ). One student enrolled in the high school 2 months into the semester. He was assigned to the L2B class (by flip of coin) and is counted in the starting sample pool. After assignment to the classes, the control class had four withdrawals (moved out of state  $n=1$ , no longer enrolled in the high school  $n=3$ ) and the L2B class had no withdrawals.

At the start of the semester, there were a total of 14 potential class sessions. Two classes were cancelled because of school closure due to extreme weather, and one class was cancelled because of a scheduled guest speaker during the class period. We were unable to offer make-up classes for the three cancelled classes because the school days were full with other classes or scheduled activities. Similarly, cancelled classes for the control group were not made up. This resulted in a total of 11 classes (i.e., for both the L2B and control classes).

The class attendance rate was calculated (# of classes attended/# total potential classes) for students who remained enrolled in the school over the entire semester. Three students attended four or fewer classes due to a mandatory parenting class that was scheduled during the same time and were not included in class attendance. All three of these students had been assigned to the L2B class. This resulted in 11 students in the L2B class and 9 students in the control class for purposes of calculating class attendance. One student enrolled in the high school 2 months after the first class, and we elected to include him in the class attendance rate because he had no conflicting class requirement. We calculated his class attendance rate based on his total amount of six potential classes. Table 2 provides an overview of the class attendance rates for students who attended  $\geq 5$  classes,  $\geq 8$  classes, or all 11 classes. As expected, class attendance was high for both groups since

**Fig. 1** Study flow chart for student enrollment and retention



**Table 2** Number and percentage of weekly classes attended by students

Learning to BREATHE group		
Number (%) of classes attended	<i>n</i> <sup>a</sup>	% of participants
Five or more classes (45.4 %)	11	100 %
Eight or more classes (72.7 %)	9	81.8 %
All 11 classes <sup>a</sup> (100.0 %)	2	18.1 %
Control group		
Number (%) of classes attended	<i>n</i>	% of participants
Five or more classes (45.4 %)	9	100 %
Eight or more classes (72.7 %)	9	100 %
All 11 classes (100.0 %)	1	10 %

Class attendance was calculated for the students who remained enrolled in the high school for the duration of the school semester or did not have conflicting parenting classes (three Learning to BREATHE students)

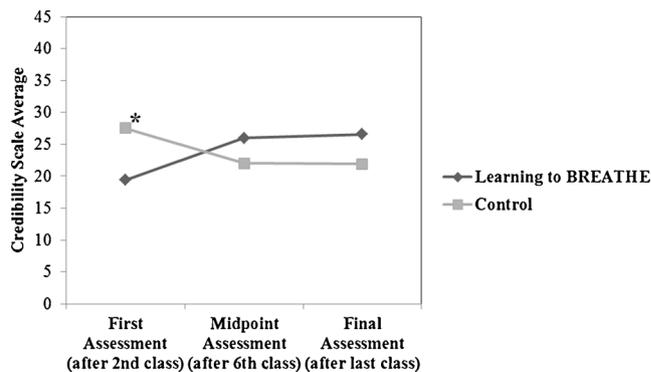
<sup>a</sup> For one student who enrolled into the school late, we calculated his compliance rate based on his potential total number of classes

this was a mandatory class period. Approximately 81.8 % in the L2B class and 100 % in the control class attended eight or more classes. We did not formally collect data on reasons for absence, but some reasons included competing school activities (i.e., special educational training opportunities), illness, and school suspensions.

To access the students' acceptability of their assigned class, groups were compared on their class credibility scale as previously reported using independent *t* tests. The three L2B students who were absent due to a parenting class were retained only in the first credibility analysis. The student who enrolled in the school late completed a first (after his first two classes) and a final credibility scale, but not a midpoint credibility scale.

The results indicated that the L2B class had lower perceived credibility following the second class ( $M=19.36$ ,  $SD=8.80$ ) than the control class ( $M=27.55$ ,  $SD=9.53$ ;  $t(17) -1.99$ ,  $p=0.06$ ; Hedge's  $g=-0.86$ , 95 % CI:  $-1.74$ ,  $0.02$ ). However, there were trends towards higher perceived credibility in the L2B class than the control class at the midpoint (L2B  $M=26.00$ ,  $SD=9.69$ ; control  $M=22.00$ ,  $SD=7.07$ ;  $t(15) 0.96$ ,  $p=0.35$ ; Hedge's  $g=0.44$ , 95 % CI:  $-0.47$ ,  $1.35$ ) and final assessments (L2B  $M=26.60$ ,  $SD=9.48$ ; control  $M=21.89$ ,  $SD=9.61$ ;  $t(17) 1.07$ ,  $p=0.29$ ; Hedge's  $g=0.47$ , 95 % CI:  $-0.40$ ,  $1.34$ ). Figure 2 provides an overview of these data.

Note that including the three parenting-class students in the final credibility scale analyses indicated a similar pattern of higher credibility in the L2B class (L2B  $M=27.84$ ,  $SD=8.66$ ; control  $M=21.89$ ,  $SD=9.61$ ;  $t(20) 1.52$ ,  $p=0.14$ ; Hedge's  $g=0.63$ , 95 % CI:  $-0.21$ ,  $1.47$ ). As mentioned previously, we were unable to do a similar test for the midpoint credibility scale because the three parenting-class students did not complete one.



**Fig. 2** Acceptability of assigned class at first, midpoint, and final assessment. \* $p=0.06$

To access fidelity of the L2B program, the L2B classes were audio-recorded, with permission of the students and their parents or guardians, and transcribed verbatim. Until the last few classes, students' participation in class discussions was minimal. Because of these limited data, we elected to include all students' quotes that were relevant to the acceptability aims of the study rather than conducting a formal qualitative analysis (e.g., using grounded theory).

Initially, there was a good deal of resistance to the L2B class, with apathy expressed towards the introduction of mindfulness, and significant discipline and behavior issues. For example, in class 2, a student answered her cell phone in class. When the instructor asked her to put it away, she stated that it was her employer and walked out of the classroom to take the call. In the same class, a student made sexual remarks in relation to a mindful eating activity. In class 3, a student was sent to the principal's office for disrupting the class with excessive talking and joking. However, class 4 appeared to be a turning point, which may have been the result of a few changes. First, this class was held in the gym instead of the math classroom, where it had been held for the first three classes. The gym afforded a larger, quieter and more private space that was conducive to class practices like body scan and yoga. Student comments (see below) attested to the shift in motivation that followed this move. Secondly, this class began with a 20-min body scan. Third, the part-time school nurse who was familiar to the students attended and participated in this class. Fourth, the instructor had begun coming to the school on an alternate day during the week to participate with the students in an elective class involving sports and games. Thereafter, all subsequent classes were held in the gym, began with a 20-min body scan or restorative yoga session, and the school nurse attended. Acceptability of the class seemed to build from this point, and the following selected comments illustrate this shift.

## Class 5

After a session of restorative yoga:

Student #1: Can we do this every day?

## Class 8

In response to another student's comment that this class might be more appropriate for adults since they have more stress than teens:

Student #2: It's soothing, it really does help me. Yeah, adults may have more stress, but teens have schoolwork and some have kids as well. Sometimes it's more overwhelming being a teen. Yeah, I like it [the mindfulness class].

## Class 9

In reply to a query about how the class was going for them:

Student #3: I like it. We should have it next semester. For my next period, I'm not too sleepy ... I'm less stressed... That's why I like this class.

Student #4: I like it because it gives us time to relax.

Student #5: It gives you a few minutes to not worry about other things.

Student #6: Can we stay here another hour?

After the ninth class, there was a conversation over lunch about an upcoming field trip to Washington D.C. One student remarked to the mindfulness instructor, "Maybe you should be a chaperone now that you are part of the school." The following Monday, after the instructor participated in a volunteering effort at a local home for the elderly, a different student made a similar comment to the instructor, indicating that she was now perceived as "part of the school" [instructor's field notes].

## Class 11

In the last class, a more lengthy discussion about the overall course took place, including a dialogue about whether students would want it to be offered the following year. Below is an excerpt of this exchange.

Student #5: I want to do it again.

Student #6: I would like to do it again too.

L2B Instructor: Can you say why?

Student #4: I liked this class because it's the only class where you actually have the time to relax and think about yourself and like I guess how you're doing in your life and I feel like your mind is calm for a few minutes –and that's why I like this class.

Student #1: Yeah, I completely agree.

Student #7: So I agree with what that dude just said ...

Student #4: I really appreciate this class. It gives you a chance to think and not have to worry about what's going on around you because you have the chance to just lay back and chill versus just being in the actual classroom environment where people are throwing papers at you or something – it's just crazy- you can't get to a good point where you're really like thinking clearly, yeah, but when you're out here it's really quiet and stuff ... it's really peaceful, yeah, and I think the environment that's provided for us really helps us out, being able to just like chill and think and for it to [be] a positive experience for us.

At a later point in the discussion, participants commented about the move from the classroom to the gym:

Student #4: We were going crazy in there.

L2B Instructor: So what do you think [about moving to the gym] changed your behavior?

Student #4: I guess it was the classroom feel, like if you're in a classroom you don't really feel relaxed all the way, here it doesn't really feel like a classroom – you take your shoes off, you know kick back. But yeah, like I said I wouldn't be able to be completely chill in the classroom, they might throw some questions at me like what's the answer to this and I'll be like what, what? I can't really let my guard down because of the environment of the school itself, just the thought that it's a school...

L2B Instructor: (to another student) Did you want to say something about that?

Student #7: Yeah, I don't know, it's just something about being at a school that makes a student not want to do the work or what they are told to do, so us being at a gym where we play and play sports and stuff– I guess it's just like an environment that we actually like to do this stuff in.

L2B Instructor: So you think that having a class, this kind of class in an actual physical classroom that you're used to doing work in, wouldn't work?

Student #7: Yeah, I mean it wasn't working.

L2B Instructor: Right, and you think the move – because this is a place that you associate with...

Student #7: Like playing and having fun.

In addition to the importance of having a physical space with which students have positive associations, it was important that students felt safe. In the following excerpt which took place in the same discussion, one student remarked that she had not been comfortable with leaving her cell phone and backpack on the bleachers in the gym, as had been suggested to students at the beginning of each class.

L2B Instructor: What would you like to see changed?

Student #5: If we can have our stuff next to us. I don't like keeping my stuff far away from me after what happened.

School Nurse: Interesting, you feel uncomfortable having to leave it?

Student #5: Yeah. I don't want someone to take my things...If I don't have my stuff next to me, I get very paranoid.

Interestingly, this student was the only one who voiced mixed feelings about the class; she expressed that she had difficulty laying down for the body scan and restorative yoga:

Student #5: I'm not the type of person who just likes to lie there ... so doing this is kind of boring for me, I just stare off ... unless I'm taking a nap, and it's too early for me to take a nap... I'm the type of person who likes to stand up and do something ... I need to get up.

In general, students agreed that the class was beneficial in providing a time and space where they could nurture themselves and alleviate stress. They were in favor of continuing the class into the next school year. Providing a physical space where students felt safe, comfortable, and could relax seemed to be critical to the acceptability of the class.

Twenty-eight students completed the baseline psychosocial assessment; however, baseline assessment analysis consisted of 27 students (L2B:  $n=14$ , control:  $n=13$ ) due to a student's departure prior to class assignment. For the final psychosocial assessment, four additional students had withdrawn from the study (no longer enrolled at the school; control:  $n=4$ ) and two students chose not to complete it although present (L2B:  $n=2$ ). Additionally, two students' final assessments were excluded because the majority of their assessments were incomplete and the completed portions were suspect (i.e., completed in less than 5 min for a 20 min assessment, with all 1's; L2B:  $n=1$ , control:  $n=1$ ). This resulted in 19 final assessments for analyses (with fewer  $n$  depending on scales completed). We included the parenting-class students in the psychosocial analyses, but we also report if excluding the students altered the findings (i.e., effect sizes).

Descriptive data (means, medians, effect sizes, and 95 % CI) for the psychosocial outcomes at the baseline and final assessments and their change scores are presented in Table 3. The L2B and control class did not significantly differ on psychosocial outcomes at baseline. We then compared the L2B and control classes on their change scores (final minus baseline) with Mann-Whitney-Wilcoxon tests and calculated the effect sizes (Hedge's  $g$ ) with 95 % confidence intervals. Results indicated that the L2B class's change in depression (SMFQ) significantly differed from that of the control class

( $p=0.03$ ; see Table 3 for descriptive values) and the effect size for comparing their change scores was large (Hedge's  $g=-1.26$ , 95 % CI:  $-2.21, -0.30$ ; Fig. 3). Specifically, scores on the SMFQ decreased (improved) in the L2B class, whereas the scores increased (worsened) in the control class (see Fig. 4). However, given the small sample size and the wide 95 % confidence intervals, these results should be interpreted with caution.

For the remaining psychosocial outcomes, L2B and control classes did not significantly differ on their change scores. We found effect sizes that were small for social connectedness (Hedge's  $g=-0.23$ , 95 % CI:  $-1.11, 0.64$ ), and anxiety (Hedge's  $g=-0.29$ , 95 % CI:  $-1.18, 0.59$ ), and moderate for mindfulness (Hedge's  $g=0.51$ , 95 % CI:  $-0.37, 1.40$ ) and perceived stress (Hedge's  $g=0.46$ , 95 % CI:  $-0.43, 1.34$ ). These were generally in the direction of more favorable outcomes for the L2B class than the control class (i.e., positive effect size indicates greater amount of that variable in L2B; see Fig. 4). Interestingly, the L2B class showed some decrease (improvement) in anxiety, whereas the control class increased (worsened) in their anxiety level (Fig. 4). However, these effect sizes should be interpreted with caution because the 95 % confidence intervals were of wide range, thus indicating poor precision.

We also calculated effect sizes (Hedge's  $g$ ) and 95 % confidence intervals for psychosocial outcomes (i.e., compared the classes on their change scores) that excluded the three parenting-class students in the L2B class. Similar to the analyses including the parenting-class students, we found large effect sizes for depression and small to moderate effect sizes for mindfulness, anxiety, and perceived stress (see Table 4 for details). In contrast to analyses including parenting-class students, we found a medium effect size for social connectedness (Hedge's  $g=-0.48$ , 95 % CI:  $-1.11, 0.64$ ) indicating a greater increase for the control group than for L2B. As mentioned previously, the 95 % confidence intervals were wide (i.e., poor precision); therefore, these results should be interpreted with caution.

In summary, the psychosocial analyses indicated that the L2B class was associated with larger improvements in depression and anxiety relative to the control class. Additionally, we found some indication for small to medium effects for comparing the classes' changes on social connectedness, perceived stress, and mindfulness.

## Discussion

The primary purpose of the present study was to determine the feasibility and acceptability of teaching mindfulness to high-risk, ethnically diverse adolescents in an alternative high school setting. A secondary aim was to explore the effects of

the intervention on psychosocial outcomes. As many high-risk adolescents are exposed to cumulative environmental stressors, intervening at this critical point is necessary in order to avoid long-term negative consequences.

Attendance and enrollment data from this study revealed that conducting a mindfulness class with ethnically diverse, at-risk adolescents is feasible. The attendance rate for the mindfulness class (students who attended more than 8 classes) was 81.8 %, which is greater than that of other reported mindfulness interventions with adolescents (e.g., Biegel et al. 2009; Himelstein et al. 2011). A number of changes to the school schedule including weather-related cancellations, school assembly, competing obligations from other classes (e.g., parenting, English as a Second Language [ESL], and preparatory for American College Testing [ACT]) and school suspensions interfered with the original plan to offer 14 sessions. Nonetheless, we were able to successfully implement the class for the duration of the semester by reducing the

number of times that mindfulness skills were practiced. According to reports from the school administration, other outside personnel who were brought in to conduct Navigation classes at the high school have not always been able to meet their commitment and stay for the full length of the semester. In future studies, we recommend that discussions with school staff take place prior to implementation of the program to discourage scheduling competing activities or classes during the same period (i.e., parenting class). However, we also understand that this may not be possible due to complicated scheduling demands that often take place at schools.

Care was taken to assess the credibility of both programs from the students' point of view. After the second class, the mindfulness group scored lower than the control class, indicating that they had less belief in the relevance of their class to their lives than those in the control class. However, as the semester progressed, participants in the mindfulness class grew stronger in their belief that their class was effective,

**Table 3** Descriptive data for psychosocial outcomes at baseline and final surveys with change scores (final minus baseline) and associated effect sizes (Hedge's *g*)

	Learning to BREATHE class <i>M</i> ( <i>SD</i> )	Control class		Hedge's <i>g</i>	95 % CI	Cronbach's alpha	
		<i>Mdn</i> ( <i>IQR</i> )	<i>M</i> ( <i>SD</i> )				<i>Mdn</i> ( <i>IQR</i> )
<b>Mindfulness (CAMM)</b>							
Baseline	27.14 (6.94)	26.50 (12.00)	27.00 (4.91)	26.00 (8.50)	–	–	0.76
Final	27.63 (8.03)	26.00 (12.00)	23.75 (7.61)	22.50 (11.25)	–	–	0.93
Change	0.64 (6.07)	0.00 (21.00)	–2.50 (5.50)	–1.00 (15.00)	0.51	(–0.37, 1.40)	
<b>Self-compassion (SCS)</b>							
Baseline	3.08 (0.39)	3.08 (0.69)	3.06 (0.31)	3.08 (0.46)	–	–	0.13
Final	3.23 (0.55)	3.00 (0.25)	3.33 (0.78)	3.04 (1.23)	–	–	0.81
Change	0.20 (0.48)	0.17 (1.75)	0.22 (0.52)	0.08 (1.50)	–0.04	(–0.91, 0.83)	
<b>Social connectedness (SOC)</b>							
Baseline	35.43 (12.16)	35.50 (19.25)	33.69 (11.39)	36.00 (21.00)	–	–	0.94
Final	36.64 (12.22)	38.00 (18.00)	37.00 (10.44)	35.50 (18.50)	–	–	0.96
Change	–1.27 (9.83)	2.00 (35.00)	1.00 (8.57)	1.50 (29.00)	–0.23	(–1.11, 0.64)	
<b>Perceived stress (PSS)</b>							
Baseline	20.36 (4.37)	20.00 (6.00)	18.62 (3.64)	19.00 (6.00)	–	–	0.41
Final	18.72 (2.61)	19.00 (3.00)	14.87 (7.45)	17.50 (14.25)	–	–	0.68
Change	–1.27 (3.66)	–2.00 (11.00)	–3.25 (4.74)	–1.00 (13.00)	0.46	(–0.43, 1.34)	
<b>Anxiety (STAI)</b>							
Baseline	43.61 (12.35)	40.00 (23.33)	42.31 (7.74)	46.67 (13.33)	–	–	0.65
Final	44.58 (14.36)	50.00 (23.33)	42.00 (10.80)	43.33 (17.50)	–	–	0.69
Change	2.08 (17.72)	0.00 (36.67)	–2.33 (11.12)	0.00 (10.83)	–0.29	(–1.18, 0.59)	
<b>Depression (SMFQ)</b>							
Baseline	7.36 (6.31)	5.50 (10.00)	5.23 (5.77)	4.00 (9.00)	–	–	0.93
Final	5.09 (6.02)	2.00 (13.00)	8.87 (7.20)	11.50 (14.50)	–	–	0.95
Change	–2.64 (5.28)	–1.00 (17.00)	4.50 (5.63)	2.50 (13.00)	–1.26	(–2.21, –0.30)	

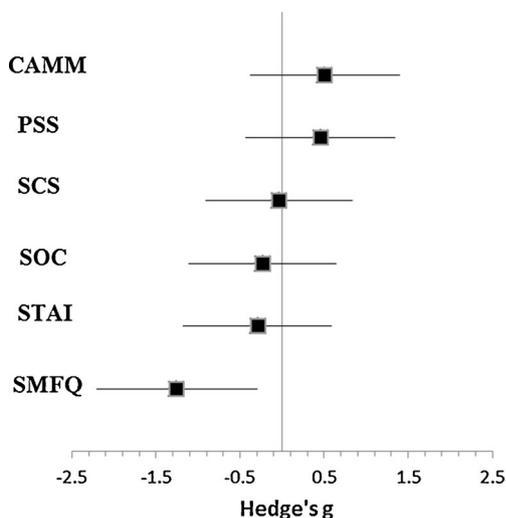
Data includes the three Learning to BREATHE students who had a conflicting parenting class. Baseline survey *n*=27–23; final survey *n*=19–18  
*M* mean, *SD* standard deviation, *Mdn* median, *IQR* interquartile range, *CAMM* Child and Adolescent Mindfulness Measure, *PSS* Perceived Stress Scale, *SCS* Self-Compassion Scale, *STAI* State-Trait Anxiety Inventory, *SOC* Social Connectedness, *SMFQ* Short Mood and Feelings Questionnaire

and those in the control group seemed to lose confidence in the effectiveness of their class. Being initially resistant to a school outsider coming to present “foreign” activities such as using one’s senses to explore a raisin or spending a few minutes to “feel one’s breath” is completely understandable and has been reported in similar studies (Himelstein 2011; Himelstein et al. 2014). As explained by the school administration prior to the beginning of the study, these adolescents have experienced frequent and often profound disappointments by adults over the course of their lives, and therefore are likely to be reluctant to try new experiences, especially when presented by someone with whom they do not have a prior trusting relationship. For this reason, the mindfulness instructor frequently stayed after class to eat lunch with the students. She also came to the school on another day during the week to participate in an elective class, which involved either sports or board games. As students developed a relationship with the mindfulness instructor and felt safe with her in the gym environment, qualitative data revealed that the mindfulness class helped them feel less stressed. As one student reported, “This is the only place where I actually get time for myself...and where my mind is calm for a few minutes.”

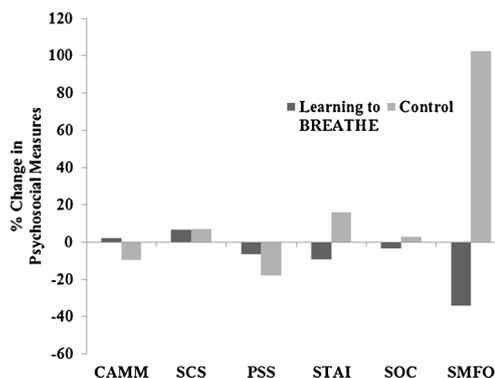
In sum, there were a number of factors that we believe contributed to the acceptability of the program. These include the following:

*Establishing a Physical Space Where Students Felt Safe*

Qualitative data determined that the physical space where the class took place was of utmost importance. As one student aptly commented, “[The classroom space] wasn’t working.” For many of these students, the classroom space



**Fig. 3** Effect sizes (Hedge’s g) and 95 % CI for comparing the groups on their change scores. *CAMM* Child and Adolescent Mindfulness Measure, *PSS* Perceived Stress Scale, *SCS* Self-Compassion Scale, *STAI* State-Trait Anxiety Inventory, *SOC* Social Connectedness, *SMFQ* Short Mood and Feelings Questionnaire



**Fig. 4** Percentage of change (post-baseline) in the Learning to BREATHE and control groups’ psychosocial outcomes. Positive % change in the PSS, STAI, and SMFQ indicates a more maladaptive outcome. *CAMM* Child and Adolescent Mindfulness Measure, *PSS* Perceived Stress Scale, *SCS* Self-Compassion Scale, *STAI* State-Trait Anxiety Inventory, *SOC* Social Connectedness, *SMFQ* Short Mood and Feelings Questionnaire

was a place with strong negative associations, often equated with extreme stress and failure. In contrast, the gym was a place where they “had fun”. Furthermore, the somewhat more private gym space appeared to reduce the self-consciousness characteristic of adolescents and may have allowed them to be more accepting of the messages of the program. In the discussion that took place in the last class, students suggested that the soothing physical environment could be enhanced even further. One student suggested, “You know what we should do? We should dim the lights and make like a real chill environment and get some incense ...” Another student suggested having “furry walls”. On the other hand, one student seemed to have trouble relaxing and engaging fully in both the body scan and the restorative yoga. Perhaps she did not feel safe because as she indicated, she was worried about her personal belongings that were left on the gym bleachers. In future studies, it is recommended that students be allowed to keep personal belongings with them if they feel the need to do so. Clearly, providing a “chill” environment in a safe physical

**Table 4** Effect sizes for psychosocial outcomes without parenting class students

	Hedge’s g	95 % CI
CAMM	0.34	(-0.58, 1.40)
SCS	-0.05	(-0.96, 0.85)
PSS	0.37	(-0.54, 1.28)
STAI	-0.13	(-1.03, 0.78)
SOC	-0.48	(-1.11, 0.64)
SMFQ	-1.31	(-2.31, -0.30)

Negative effect size indicates higher magnitude in control group

*CAMM* Child and Adolescent Mindfulness Measure, *PSS* Perceived Stress Scale, *SCS* Self-Compassion Scale, *STAI* State-Trait Anxiety Inventory, *SOC* Social Connectedness, *SMFQ* Short Mood and Feelings Questionnaire

space was crucial to the successful implementation of a mindfulness program with these students.

*Utilizing School Personnel as a Class Assistant* This may be particularly salient when the instructor is not a school employee. Beginning with the fourth class, the school nurse participated in the mindfulness classes. Although she was part-time staff at the school, she had a relationship with the students and served as an assistant in the mindfulness classes by helping to get cushions distributed to students, occasionally participating in discussions, and facilitating the restorative yoga sessions. Although the effect of her contribution to the success of the program was not measured, her participation seemed to ease the flow of the class, and may have helped facilitate the relationship between the students and the mindfulness instructor.

*Spending Informal Time Outside of Class with Students to Establish Trust* Research on social-emotional learning (SEL) programs report that benefits accrue to students when school personnel (e.g., classroom teachers) are the program instructors (Durlak et al. 2011). Presumably, teachers have a privileged relationship with their students, making it more likely that students will respond positively to their interventions because of trust and respect. When outside “experts” offer programming, they must intentionally cultivate trust and nurture relationships with students to the extent possible. At the suggestion of the school social worker, the mindfulness instructor frequently stayed after class to eat lunch with the students and participated in other school events. The purpose of these visits was to establish informal relationships with the students outside of class. Towards the end of the semester, two students on separate occasions made comments to the instructor referring to her as “part of the school.” This was evidence of the shift from being seen as an “outsider” to an “insider” in the eyes of the students. Being seen as an insider may be essential in fostering the necessary safe environment for students to let down their guard and participate in the learning experience.

*Inviting Students to Participate, and Not Judge Them for Not Participating* As students were initially resistant to the program, we felt that requiring them to do the activities might lead to a power struggle between the instructor and the students. For that reason, we took the approach to “invite” and encourage students to engage with the activities rather than to require them to do so, as is recommended in the guidelines of the Learning to BREATHE manual. We suggested that they be open and try out the activities, but there were no negative consequences or judgment if they chose not to do so. On the other hand, some boundaries needed to be maintained. From the very beginning, students were not allowed to be on cell phones, have

headphones on during class, or disrupt others who were interested in taking part in the activities.

*Being Flexible to Minor Curriculum Adaptations in Order to Meet Students' Needs* We made a number of adaptations to the curriculum, as indicated in the methods section. For the most part, adaptations included spending more time with mindfulness of the body activities (i.e., body scan, restorative yoga, mindfulness of sound) and less time with sitting meditation. After the third class, each class began with 15–20 min of either a body scan or restorative yoga. Students used yoga bolsters, meditation cushions, and scented eye masks to nestle into comfortable supine positions. After asking their permission, the school nurse adjusted the cushions around their bodies so that they would receive maximum support from the cushions. This small act itself connoted a sense of nurturance, an impression of being “tucked into bed” by a caring adult.

Although we did not formally interview school personnel about their views of the program, the school principal and social worker reported to us anecdotally that they were very happy with the program and expressed a desire for the class to be held again in the upcoming school year.

In comparing change scores, results indicated a statistically significant difference in depression between the intervention and control groups, with a large effect size. Further, the comparison of change scores in anxiety suggested that the intervention group decreased in anxiety, whereas the control group increased (see Fig. 4). Reductions in depression and anxiety through mindfulness interventions have also been reported in other studies with adolescents (Kuyken et al. 2013; Sibinga et al. 2013). The difference we found was likely due to the control class worsening in symptoms and the L2B class improving. Interestingly, in both cases, the control group worsened to a greater degree than L2B group improved. The final assessment took place in the last few weeks of the school year; therefore, it is possible that students were feeling pressure because of failing grades and the possibility that they would not graduate. This may have resulted in a large increase in depression and small increase in anxiety symptoms in the control group, whereas the mindfulness tools may have helped the L2B students to better cope with the academic pressure that the end of school brings for students who struggle academically. However, the sample size was very small and more research would be essential to support such conclusions.

Contrary to expectations, both groups indicated experiencing slightly *less* stress at the time of the final assessment. One potential explanation for this is that students who have struggled in academic settings may have “given up” by the end of the school year. That is, they may have turned their frustration inward and became depressed or anxious, but did not interpret these feelings as stress, defined here as feeling overloaded,

overwhelmed, and out of control. It may be that these students can relate to the physical sensations of being anxious (e.g., feeling jittery) when under pressure but have given up trying to stay in control or on top of life's hassles and therefore feel more disconnected and withdrawn.

Although we found no effect size difference in self-compassion between the L2B and control classes (see Table 3 and Fig. 4), it is worthy to note that self-compassion improved in both classes. One component of self-compassion is recognizing that others struggle and are faced with similar challenges as oneself, and as such, one is integrally connected to a larger common humanity (Neff 2003). Spending even one class period weekly in a supportive atmosphere, while focusing on self-care and adolescent issues, may have contributed to the increase in self-compassion found in both groups.

As recent research has demonstrated that the negative health effects of early life adversity is inversely associated with greater dispositional mindfulness (Whitaker et al. 2014), teaching mindfulness skills to adolescents has the potential to increase their level of mindfulness and thereby buffer the negative effects of environmental stressors that many of these students experienced early in life and continue to face on a daily basis. In this study, we evidenced a small to moderate effect size between groups for changes in mindfulness, anxiety and perceived stress, and large effect size between groups for changes in depression. Although these results should be interpreted with caution due to the small sample size, this suggests that the adolescents who participated in the mindfulness class may be more protected from contextual challenges and more resilient in the face of adverse situations than their less mindful counterparts. Clearly, more research needs to be done in this area to confirm these findings.

A major strength of the study is that we tested a school-based mindfulness intervention with an ethnically diverse adolescent sample. To the best of our knowledge, no other published studies have reported on outcomes associated with implementation of a mindfulness intervention with a similarly diverse population, particularly with largely Hispanic/Latino populations. Another strength of the study is that we used an active control group that was designed from an evidence-based program for substance abuse. This class was also similar to the mindfulness group in form and structure. Both met on the same day at the same time and were led by an outsider to the school who worked for the organization that offered the program. The control class also spent longer on the beginning stages of the program that focus on building trust. As noted previously, we felt that the students' trust and safety was important to establish before they could be more receptive to the intervention. We did not assess trust, but interestingly, despite both groups' attention to building trust, the L2B class experienced larger reductions in depression compared to the control class, suggesting that it was not the trust per se that resulted in these reductions.

This study has a number of limitations to note. First, the sample size was small, limiting the generalizability of the results. Second, since this is a small school where the students have all their classes together, it is very conceivable that they shared their experiences about both the mindfulness and control group classes with each other (i.e., spill-over effects). Therefore, these findings need to be examined with larger samples of ethnically diverse, at-risk adolescents in different school districts or nationally, where cluster randomized study designs may be used (Murray et al. 2004). Third, there was a great deal of transition at the school. During the study semester, students often moved to or from the area or transferred to other schools. In addition, students frequently missed classes for several weeks at a time due to school suspensions or being enrolled in substance abuse treatment centers. This made it challenging to establish and maintain a sense of group cohesion in the mindfulness class, as well as to ensure that all students were receiving a minimum dose of mindfulness training and mindfulness practice. However, this is also the reality of working in an alternative school whose purpose is to aid struggling at-risk youth. Despite these challenges, we were still able to demonstrate feasibility and preliminary psychosocial improvements. Fourth, reliability scores were particularly low at baseline for the self-compassion scale, limiting the degree to which this scale is reliable. Interestingly, a readability index determined that the reading level for this scale was the highest of all the scales. This index demonstrated that the self-compassion scale is at a reading level comparable to middle 8th grade. In contrast, the other scales had much lower reading levels (i.e., grade 2.5 for the mindfulness scale and grade 3.8 for the depression scale). It is possible that for this population of students, half of whom were ESL students and many of whom were challenged academically, the combination of the reading level and the lack of familiarity with the concepts assessed (i.e., at baseline) contributed to the low reliability. We suggest that a more easily readable scale be developed that will effectively assess the construct of self-compassion. Finally, we were unable to track the amount of students' daily mindfulness practice outside of school or assess whether they continued to practice after the study class ended. We chose not to collect this information (i.e., using logs) in order to limit participant writing burden and to prevent the request to practice mindfulness being viewed as more "school homework". Therefore, we were unable to determine if more practice was related to greater improvement. Future studies should consider collecting intrinsically motivated outside mindfulness practice by asking students to record on notecards at the beginning of each class how much they had practiced since the last class.

In relation to the research protocol itself, another limitation was that the online assessment was lengthy and some students were resistant to completing the final assessment. Although we offered chocolates and snacks both before and after taking

the assessment, two students opted not to take the final assessment at all, and two others' data were suspect and not usable. For future studies, it is recommended to limit participant burden by using brief online assessments and incentives whenever possible. Assessments should also be suited to students' reading levels.

### Implications for Implementation

There are numerous implications for future mindfulness interventions for ethnically diverse, at-risk students. Perhaps most importantly, successful implementation depends on the ability to be flexible and responsive to a school's schedule changes and the student population's unique needs, while maintaining integrity of the program's core concepts. We found that in this at-risk student population, it is critical to establish a safe space, both physically and psychologically, where students feel that they can relax and let go of the daily burdens that at-risk students all too often carry with them. This would require a physical environment in which they have positive associations and a psychological environment where there is a sense of trust. We also suggest integrating school personnel with whom students have positive relationships into the class whenever possible, perhaps through teaching a skill they might know (e.g., yoga). If non-school personnel are teaching the mindfulness class, we strongly recommend that the instructor spend time outside class with students, possibly through attending school activities in the evenings, having lunch with students, or tutoring students after school.

Recognizing that research in mindfulness interventions with ethnically diverse, at-risk adolescents is in its very early stages, this study contributes to the literature by confirming the feasibility and acceptability of a mindfulness intervention with this population and expands our knowledge on what works. Recommendations for future studies include incorporating larger ethnically diverse, at-risk samples from various school districts in our continuing investigations of mindfulness with youth.

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