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Learning to BREATHE: A Pilot Trial of a Mindfulness Curriculum for Adolescents

Key words: mindfulness; meditation; emotion regulation; adolescents; program evaluation

Introduction

Contemporary education reforms have placed a necessary and well-intended emphasis on skills and knowledge

A B S T R A C T

This study reports the results of a pilot trial of Learning to BREATHE, a mindfulness curriculum for adolescents created for a classroom setting. The primary goal of the program is to support the development of emotion regulation skills through the practice of mindfulness, which has been described as intentional, non-judgmental awareness of present-moment experience. The total class of 120 seniors (average age 17.4 years) from a private girls' school participated as part of their health curriculum. Relative to controls, participants reported decreased negative affect and increased feelings of calmness, relaxation, and self-acceptance. Improvements in emotion regulation and decreases in tiredness and aches and pains were significant in the treatment group at the conclusion of the program. Qualitative feedback indicated a high degree of program satisfaction. The results suggest that mindfulness is a potentially promising method for enhancing adolescents' emotion regulation and well-being.

acquisition in the interest of preparing students for the global economy they will enter. This emphasis reflects the context in which schools function today, one of rapid social change, high demands for vocational preparation, and knowledge overload. Such reforms, however, have also contributed to a surge in high-stakes testing and an increase in competitive educational environments. Schools now function under a set of pressures that early creators of our school system could hardly have imagined. Clearly, the mission of schools remains one of preparing students academically for the world of higher education, work, and good citizenship. However, the social landscape has shifted and, increasingly, schools are also charged with oversight and management of students' social and emotional problems, which often seep into the fabric of their academic pursuits.

By most accounts, mental health problems are increasing among young people, possibly reflecting greater awareness of disorders (Achenbach, 1995), and also resulting from the increased number and intensity of stressors on young people (Caspi *et al*, 2000). Problems such as depression, which used to be the province of adults, now beset younger and younger generations (Cross National Collaborative Group, 1992; Kovacs & Gatsonis, 1994). Rates of anxiety disorders in children and young people are also high (Foa *et al*, 2005). Some conclude that the rise in mental health problems stems from the pressures associated with rapid social change, combined with the breakdown

of many traditional cultural anchors, such as families, neighborhoods and institutions (Kovacs, 1997). A report by the U.S. Surgeon General (U.S. Public Health Service, 2000) reported that one in ten children suffers from a mental health condition that meets diagnostic criteria, and one in five suffers from problems that significantly impair day-to-day functioning. Most young people with mental health problems do not receive treatment, and those who do receive services access the services primarily through their schools (Burns *et al*, 1995; Rones & Hoagwood, 2000). The U.S. Surgeon General report explicitly recognized the need to consider mental health as a critical component of overall child health, and advocated active promotion of social, emotional and behavioral well-being.

The Carnegie Task Force on Education (1989) wrote in its landmark report:

School systems are not responsible for meeting every need of their students. But when the need directly affects learning, the school must meet the challenge (in Adelman & Taylor, 2006 p296).

Schools have tried to respond to the challenge of students' mental health problems in many ways, including provision of special education services and implementation of clinical services. Such treatment approaches have been criticized for being fragmented, exclusively problem-focused, and dependent upon meeting criteria for psychiatric diagnosis or special education in order to be accessed (Slade, 2003; Weist, 1999). In addition, competing approaches to providing mental health services in schools derive from multiple theoretical models (for example educational v. psychological), each with its own language and set of assumptions (Kutash *et al*, 2006).

Recently, there has been increased emphasis on closing the gap between the needs of young people and the services available to meet those needs (New Freedom Commission on Mental Health, 2003). To accomplish this goal, a comprehensive model is needed, such as the collaborative and holistic system of 'expanded school mental health' (ESMH) proposed by Weist (1997). This approach incorporates existing relevant services and broadens them into a comprehensive network that includes assessment, case management, therapy and prevention.

Prevention is a fundamental component of any comprehensive plan. Recent research describes how internal vulnerabilities interact with external conditions

to produce maladaptive psychosocial outcomes, and how protective factors can operate to foster resilience (Cicchetti & Cohen, 1995; Luthar & Cicchetti, 2000; Richardson, 2002; Rutter, 1987). The presence of risk factors, in the absence of sufficient protective factors, can foreshadow problem behaviors. When protective factors are strengthened, more positive outcomes can occur. Good prevention programs are rooted in a fundamental understanding of human development, namely that the developmental work of childhood and adolescence is facilitated in circumstances that promote resilience (Catalano *et al*, 2004).

Not only do evidence-based prevention programs in schools reduce problem incidence; they also build on skills for mental health throughout life (Greenberg *et al*, 2003). Thus, prevention reaps a double benefit: reducing social and emotional problems, and promoting positive behavior in young people. Teaching students a skill set for social and emotional well-being also supports qualities of attention, reflection, and motivation that make learning effective. When students suffer from mental health problems related to stress, violence, depression, eating disorders, or drug abuse, the quality of their educational experience is diminished, no matter how skilled the teacher or how well-developed the curriculum (Sroufe, 1997).

Teaching emotion regulation

A major contribution to the social and emotional skill set and a mainstay of mental health is emotion regulation. Emotion regulation is a broad construct which generally refers to the ability to recognize and manage emotions adaptively. Specific skills of emotion regulation might include awareness of emotional experience, identification of specific emotions and their intensity, constructive emotional expression, and distress tolerance (Cole *et al*, 2004; Davidson *et al*, 2000; Thompson, 1994). It is recognized that emotion dysregulation underlies a broad array of psychological problems, such as depression, anxiety, eating disorders, conduct disorders and substance abuse (Bradley, 2000; Cicchetti *et al*, 1995). It also inhibits achievement of social and emotional milestones in development (Siegel, 1999).

Currently, ancient contemplative or mindfulness-based practices are moving into secular settings as a way of fostering emotion regulation skills and cultivating well-being (Hayes *et al*, 1999; Kabat-Zinn, 1990; Linehan, 1993; Segal *et al*, 2002). As Germer points out, the word 'mindfulness' can be used to describe:

a theoretical construct (mindfulness), a practice of cultivating mindfulness (such as meditation) or a psychological process or state of consciousness (being mindful) (2005 p6).

For sake of clarity, we define **mindfulness** as a way of paying attention (being mindful) that is intentional, trained on the present moment, and maintained with an attitude of non-judgment (Kabat-Zinn, 1994) and **meditation** (or mindfulness meditation) as deliberate training of attention to cultivate this state. Contemplative practices and mindfulness practices are used synonymously, as both are means to still the mind and promote insight and concentration (Zajonc, 2006).

Recent research has demonstrated the potential of meditative practices to support the goals of education such as improved attention, concentration, creativity, and emotional intelligence (Cowger & Torrance, 1982; Goleman, 1995; Mayer & Salovey, 1997; see also Shapiro *et al*, 2008, for a review of research on meditation and higher education). In addition, the practice of mindfulness meditation increases awareness of the mental processes that contribute to emotion dysregulation and offers a means of coming back into balance when strong emotions arise. Mindfulness provides a way of working with emotions as they are experienced. In addition to learning about emotions, there is a distinct advantage in learning how to notice what is occurring in the present moment. Attending to and identifying emotions can mitigate the emotional response or reactivity and increase emotional balance and clarity (Silvia, 2002). This practice offers the opportunity to develop hardiness in the face of uncomfortable feelings that otherwise might provoke a response that could be harmful (such as 'acting out' by taking drugs or displaying violent behavior, or 'acting in' by becoming more depressed). Learning to attend to one's present moment experience offers a tool to manage emotions as they are perceived and potentially increase in magnitude. Mindfulness training can complement and strengthen other approaches that promote emotion regulation, reduce stress, and develop attention.

Research on the effects of mindfulness meditation training with adults has shown an array of benefits. Some of these include changes in brain structures in areas related to attention (Lazar *et al*, 2005), enhanced performance in attentional tasks (Jha *et al*, 2007), increases in positive mood and immune system functioning (Davidson *et al*, 2003), improved academic

achievement in college students (Hall, 1999), enhanced empathy (Shapiro *et al*, 2007) and reduced physical symptoms and stress (Grossman *et al*, 2004). Research with children and adolescents is more limited. Some studies have documented improvements in children's and adolescents' attentional skills following meditation training (Napoli *et al*, 2005; Zylowska *et al*, 2008). Others have shown beneficial effects of meditation techniques when used to alleviate children's anxiety (Semple *et al*, 2005), to reduce aggression in a mentally retarded individual (Singh *et al*, 2003), and to promote adolescent individuation (Birnbaum, 2005). Empirical work is supported by theoretical and narrative descriptions of the benefits of bringing contemplative practices to educational settings (Brady, 2004; Hart, 2004; Holland, 2004; Wall, 2005; Zajonc, 2006). Ongoing applications of mindfulness in education attest to the dynamic quality of this movement (Brown, 2007).

At present, no school-based mindfulness curriculum for adolescents has been reported in the literature, although mindfulness skills could be important for facilitation of emotion regulation skills and for well-being in the general adolescent population. Because adolescence is a time of heightened emotionality and increased pressure to adapt to stress constructively, Learning to BREATHE was created to facilitate the development of emotion regulation skills during this period.

The study

This study reports the development and evaluation of Learning to BREATHE, a mindfulness curriculum for adolescents created for a classroom setting. Results are reported from a pilot trial of the program in a senior class from a private high school for girls. It was hypothesized that participants would show reductions in negative affect, greater understanding of emotions, reduced tendency to rumination, and decreased somatic symptoms after completing the program than a control group.

Methods

Program development

Over three years prior to the initiation of this current project, the program developer (P.B.) offered an ongoing series of mindfulness classes during lunch periods and study halls for high school students who were interested in learning about stress management.

Although students reported being pleased with the program and data indicated reductions in negative mood after completing the sessions, this delivery system had limitations. Students who wished to participate were required to give up an opportunity to socialize with friends at lunchtime or forego time to complete assignments in study hall. Other activities were scheduled concurrently with lunch and study periods (music lessons, clubs, etc) and competed for students' limited free time. Only a small self-selected group was able to benefit. Consequently, finding a way for all students to participate within their regular class day became a primary goal.

The classroom-based Learning to BREATHE program was refined and prepared for implementation over the course of a fourth year. During this time, funding was sought for partial release time for the principal researcher to implement the program, as well as for assistance with preparation of materials and data analysis. Both the principal researcher and the assistant, who was a certified teacher with classroom experience, had training in Mindfulness-Based Stress Reduction (Kabat-Zinn, 1994) and were familiar with the theory and practice of mindfulness. In order to ensure a fit for the program within a school curriculum, Learning to BREATHE program objectives were linked to standards of various curricular areas, such as school health, and to those of school professionals, notably school counselors (Bowers & Hatch, 2005).

Program structure and assumptions

Learning to BREATHE tailors mindfulness-based approaches to the developmental needs of adolescents. Goals of the program include helping students understand their thoughts and feelings and learn mindfulness tools for managing negative emotions, and providing opportunities to practice these skills in a group setting. Six lessons are built around the BREATHE acronym, and each lesson has a core theme. The six themes include body awareness, understanding and working with thoughts, understanding and working with feelings, integrating awareness of thoughts, feelings and bodily sensations, reducing harmful self-judgments, and integrating mindful awareness into daily life. The overall goal of the program is to cultivate emotional balance through the practice of mindfulness, an advantage referred to as gaining the inner edge. Students are repeatedly reminded of the intent to develop inner strength and balance as they proceed through the sessions.

Each lesson includes a short introduction of the topic, several activities for group participation and discussion to engage students in the lesson, and an opportunity for in-class mindfulness meditation practice. Workbooks and CDs for home meditation practice are provided to students as part of this program.

Program development was based on certain assumptions about adolescent development (Broderick & Blewitt, 2006). Adolescents are involved at a deep psychological level with constructing an identity and developing autonomy from adults. Emotions can become overwhelming and confusing and, although adolescents' ability to understand and manage emotions can advance, training in this area has often been neglected in school settings. This school-based program format provides for exploration of emotion regulation strategies and invites students to consider the usefulness of these tools for their lives. The discussion and practice sessions complement adolescents' increased capacity for introspection, while maintaining sensitivity to adolescents' internal pressure for social conformity and tendency to social comparison. Non-intrusive discussion of general stressors facilitates self-discovery in the peer context. Finally, the active participation of students in practice in-class and at home supports integration of program content.

Participants and method

The entire senior class ($N = 120$) of a private Catholic high school for girls in suburban Pennsylvania participated in the six-session Learning to BREATHE program as part of their health curriculum. All the participants in the previously reported lunch time and study hall classes had graduated by the start of this implementation. Before the start of the program, a letter was sent by the school principal informing parents about the program. The letter described the program and assessments, and provided parents with the investigator's contact information in order to discuss any questions they might have. The instructor presented the goals and objectives of the program to the entire senior class at an introductory assembly two months before program initiation (November). Before the administration of pre-tests and post-tests, students were informed that they could refuse to complete the assessments without any penalty. The procedures used to obtain informed consent from participants were approved by the university's Institutional Review Board.

Students from two sections of juniors ($N = 30$) from the same high school served as the control group. Only two sections of juniors were available to serve as controls. A total of 17 completed records from control participants were usable for comparison at conclusion. Assessments from the remaining 13 students were not included due to incomplete records or absences. Pre-tests were administered one week before Session 1 and post-tests were administered one week after Session 6. Only one administration of the post-test assessments was possible. Use of juniors as a control group in this study had clear limitations, arising from possible influences such as maturation or specific stressors of senior year. However, the nature of the program (universal prevention) and the structure of course scheduling in the school setting made other designs unfeasible. The curriculum for all seniors included Health during the third quarter of the year, a period of approximately seven weeks (January to March). Learning to BREATHE program objectives were linked to the Health curriculum objectives and needed to be delivered to all students within this time period. Consequently, the window of opportunity was limited for program delivery and assessment, and prevented use of other means such as waiting-list control or multiple baselines.

For this trial, program sessions were delivered approximately twice a week during seniors' regular health classes. In order to accommodate seven sections of seniors with a variety of schedules, as well as school- and weather-related interruptions, classes were staggered over a period of approximately five weeks. Class sessions ranged from 32 to 43 minutes each. A total of 42 class sessions were taught by the primary researcher (P.B.), with some support from the grant-funded assistant who was trained in the program.

The majority of the girls in the treatment group were Caucasian (93.3%) with an average age of 17.43 years ($sd = 0.53$, range 17–19 years). Most girls in the control group were also Caucasian (88.2%), but displayed a lower mean age ($M = 16.41$ years, $sd = 0.85$, range 16–17 years).

Design and measures

This pilot program evaluation used a non-randomized pre-test/post-test control group design to assess the program's impact on affect and behavior in female adolescents. Pre-test and post-test measures were administered by the students' health teacher.

Measures

The participants in both groups completed a battery of instruments including demographic information and four other measures at pre-test and post-test. Demographic items assessed age, racial/ethnic origin, and current or past meditation or yoga practice. The main outcome variables were measured with various instruments, as detailed below. With exception of age, all variables were of an ordinal measurement level.

Positive and Negative Affect Schedule (PANAS)

Positive and negative affect at the time of testing were measured by the 20-item Positive and Negative Affect Schedule (PANAS; Watson *et al*, 1988) with the addition of four items. The PANAS consists of two 10-item subscales – positive and negative affect. In this study, positive affect was measured by the 10 original PANAS items (Cronbach's $\alpha = 0.82$), while negative affect was assessed via 11 items (10 original PANAS items and an added 'anxious' item) ($\alpha = 0.81$). The addition of the *anxious* item boosted the Cronbach's α from 0.78 to 0.81. The last three items added to the scale created a 3-item calm/relaxed/self-accepting subscale ($\alpha = 0.69$). These three items were added to the scale by the primary investigator to fill a perceived gap in the scale's measured constructs. All items were measured on a 5-point Likert scale with higher scores indicative of greater perceived affect within the subscale.

Difficulties in Emotion Regulation Scale (DERS)

Ability to regulate emotions was assessed by the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS is composed of six factors: non-acceptance of emotional response (six items; $\alpha = 0.88$), difficulties in engaging in goal-directed activity (five items; $\alpha = 0.86$), impulse control difficulties (six items; $\alpha = 0.84$), lack of emotional awareness (six items; $\alpha = 0.80$), limited access to emotion regulation strategies (eight items; $\alpha = 0.87$), and lack of emotional clarity (five items; $\alpha = 0.76$). Reported alpha values for all measures were calculated based on the current study at baseline. Items were measured on a 5-point Likert scale. Higher scores indicate more difficulty in regulating emotions.

Ruminative Response Scale (RRS)

Type of ruminative response to a depressed mood was measured by the Ruminative Response Scale (RRS; Nolen-Hoeksema & Morrow, 1991). The two factors of

the RRS used in this study consisted of *reflective pondering* (five items, $\alpha = 0.65$) and *moody pondering* (or *brooding*) (five items, $\alpha = 0.51$) (Treyner *et al*, 2003). Each item was measured on a 4-point Likert scale with higher scores indicating a greater degree of the trait.

Somatization Index of the Child Behavior Checklist (SICBC)

Frequency of somatic complaints was assessed via 10 items from the Somatization Index of the Child Behavior Checklist (SICBC; Achenbach, 1991). Examples of items included feeling over-tired, and experiencing aches/pains, headaches, or nausea ($\alpha = 0.65$). Frequency of somatization was measured on a 3-point Likert scale with higher scores comparable to greater perceived frequency of complaint.

The evaluation also included a qualitative process assessment at post-test of program student participation and satisfaction, as well as levels of homework practice throughout the program.

Statistical analysis

Pre-test demographic data by program versus control group were summarized in tabular format. Using SPSS 15.0 software, chi-square tests (for nominal variables) and independent t-tests (for ordinal/continuous variables) were calculated to detect statistical pre-test differences between the program and control groups. To clarify, the non-parametric test equivalent to the independent t-test (Mann-Whitney U) was initially used to assess differences of ordinal variables between groups, but since results were comparable between the two tests, the parametric test results were reported. Mean gain scores (post-test – pre-test) for each subscale within each above mentioned measure were calculated and compared between groups with independent t-tests to assess program effectiveness. Using G*Power 3.0.10 software, effect sizes were also computed for each test using Cohen’s d. Cohen’s d is commonly interpreted as: 0.2 small, 0.5 medium, and 0.8 large.

Results

Table 1, below, displays baseline demographic characteristics by program group ($N = 120$) and control group ($N = 17$). Only age was statistically different between groups ($M_{program} = 17.4$ years, $M_{control} = 16.4$ years; $t = -7.42$, $p < 0.05$). The program and

control groups did not display any significant differences in pre-test subscale scores within any outcome measure ($p \leq 0.05$) (results not included in article).

All participants in the control group completed the post-test, but 15 students in the program group did not complete the post-test, leaving 105 program participants completing both assessments. No demographic characteristics or pre-test subscale scores were significantly different between the program participants completing both assessments ($N = 105$) versus pre-test only ($N = 17$) (results not included in article). In addition, mean imputation within respective subscales was performed on individual missing items (<0.5% of all data) in order to maximize the sample size in the analyses.

Mean gain scores (post-test – pre-test scores) were compared between groups to assess program effectiveness (**Table 2**, opposite). The mean gain scores of two of the three PANAS subscales were significantly different between program participants and the control group. Specifically, in comparison to the control group, the program participants demonstrated a significant reduction in negative affect (mean gain score -2.51 vs. 1.63; $t = 2.34$, $p < 0.05$), and a significant increase in feeling calm/relaxed/self-accepting (mean gain score of 0.90 vs. -0.65; $t = -2.06$, $p < 0.05$). No other mean gain scores within the other three measures (DERS, RRS, SICBC) demonstrated significant differences between the program and control groups.

Since *post hoc* power analyses demonstrated low power to detect significant mean gain score differences between program and control groups, paired t-tests were computed within the program group to detect differences from pre-test to post-test across the multiple

TABLE 1 Pre-test Characteristics of BREATHE Program and Control Group Participants

Variable	Program Group	Control Group	t or χ^2
	N = 120	N = 17	
Age (years)	17.4 (0.5) Range 17–19	16.4 (0.5) Range 16–17	-7.42*
Ethnicity			
White	112 (93.3)	15 (88.2)	1.49
Hispanic	3 (2.5)	1 (5.9)	
Asian	3 (2.5)	1 (5.9)	
Other	2 (1.7)	0 (0.0)	
Current or past meditation practice	21 (17.5)	2 (11.8)	0.35
Current or past yoga practice	42 (35.3)	4 (23.5)	0.92

* Significant difference between groups at $p < 0.05$ level.

TABLE 2 Differences in Mean Gain Scores (Post-test – Pre-test Scores) by Group

Scales [†]	Treatment Group		Control Group		t	Cohen's d ^{††}
	n	M (SD)	n	M (SD)		
PANAS						
Positive affect	104	0.63 (7.32)	17	-2.47 (7.75)	-1.61	0.41
Negative affect	104	-2.51 (6.59)	17	1.64 (7.92)	2.34*	0.57
Calm/relaxed/self-accepting	104	0.90 (2.86)	17	-0.65 (2.98)	2.06*	0.53
DERS						
Total	104	-3.73(13.75)	17	0.33(15.55)	1.11	0.28
Non-acceptance of emotional response	104	-0.75 (4.33)	17	-0.23 (3.88)	0.46	0.13
Difficulties in goal-directed activity	104	0.14 (4.26)	17	0.41 (4.39)	0.24	0.06
Difficulties in impulse control	104	-0.40 (3.46)	17	1.05 (2.96)	1.63	0.45
Lack of emotional awareness	104	-1.19 (3.90)	17	-1.62 (2.63)	0.44	0.13
Limited emotion regulation strategies	104	-0.93 (5.43)	17	1.08 (5.33)	1.42	0.37
Lack of emotional clarity	104	-0.61 (2.86)	17	-0.35 (3.26)	0.33	0.08
RRS						
Reflective pondering	105	0.06 (3.88)	17	-0.35 (4.27)	-0.40	0.10
Moody pondering (brooding)	105	-0.49 (2.56)	17	0.18 (2.45)	1.01	0.27
SICBC Total	105	-0.75 (2.58)	17	-0.29 (1.93)	0.69	0.20

* Independent t-test significant at $p < 0.05$ level (NOTE: Non-parametric Mann-Whitney U tests were also computed and results were comparable with the parametric counterpart test)

[†] PANAS (Positive and Negative Affect Schedule); DERS (Difficulties in Emotion Regulation Scale), RRS (Ruminative Response Scale); SICBC (Somatization Index of the Child Behavior Checklist)

^{††} Effect size measured by Cohen's d: 0.20 small, 0.50 medium, 0.80 large

measures (Table 3, overleaf). Within the PANAS, program participants displayed a statistically significant decline from pre-test to post-test in negative affect, and a significant increase in feeling calm/relaxed/self-accepting. They also demonstrated a significant decline from pre-test to post-test in the total difficulty in emotion regulation (DERS) score, lack of emotional awareness DERS subscale, and the lack of emotional clarity DERS subscale. No significant mean differences from pre-test to post-test were found within the RRS measure, whereas, in the SICBC, program participants demonstrated a significant reduction from pre-test to post-test in feeling over-tired and complaints of aches/pains (not headaches or stomach aches).

The process evaluation revealed that 86.5% of program participants were satisfied or very satisfied with the Learning to BREATHE program. Specifically, the in-class program activities rated most useful included in-class meditation practice overall, body scan meditation, and a music and emotions activity, while the activity rated least useful was in-class discussion (Table 4, overleaf). Approximately half of all participants reported that the most important skill they had learned from the program was how to deal better with stressful thoughts and feelings.

Students were also asked to indicate how often they practiced mindfulness, and 64.6% of participants indicated practicing some mindfulness techniques outside

of class during the length of the program. Multiple one-way ANOVAs and post hoc Tukey tests were computed to assess whether mean gain scores for all measures (including SICBC somatic items) were statistically changed by the amount of time the student practiced being mindful outside of class (categorized as four or more days per week, once a month to three days per week, and none). Only three mean gain scores were significant: SICBC Total, item on dizzy, and item on over-tired. Overall somatic complaints, as measured by the total SICBC score, were reduced for those practicing mindfulness outside of class for four or more days a week (Mean Gain Score = -2.53) in comparison to both those practicing less than four days a week (Mean Gain Score = -0.58) and those practicing only in class (Mean Gain Score = -0.34) ($F = 5.20, p = .008$). However, specific somatic complaints of dizziness and feeling over-tired increased for those practicing mindfulness outside of class for four or more days a week compared to those who practiced being mindful only in class (respectively, $F = 4.72, p = .012$; $F = 4.55, p = .014$).

Discussion

The results of these analyses demonstrate that participants in the Learning to BREATHE program reported reductions in negative affect and increases in feelings

TABLE 3 Pre-test – Post-test Differences for Treatment Group Participants

Scales [†]	N	Pre-test Score		Post-test Score		t	Cohen's d [‡]
		M (SD)	M (SD)	M (SD)	M (SD)		
PANAS							
Positive affect	104	26.09 (6.97)	26.72 (7.43)	-0.88	0.09		
Negative affect	104	20.71 (7.06)	18.20 (5.71)	3.89**	0.38		
Calm/relaxed/self-accepting	104	8.97 (2.75)	9.86 (2.68)	-3.21**	0.31		
DERS							
Total	104	88.39(18.27)	84.65(18.69)	2.77**	0.27		
Non-acceptance of emotional response	104	13.08 (5.47)	12.32 (5.16)	1.77	0.18		
Difficulties in goal-directed activity	104	16.19 (4.54)	16.34 (4.75)	-0.34	0.04		
Difficulties in impulse control	104	12.09 (4.22)	11.69 (4.63)	1.18	0.12		
Lack of emotional awareness	104	16.84 (4.71)	15.65 (4.67)	3.12**	0.30		
Limited emotion regulation strategies	104	17.51 (5.96)	16.58 (6.09)	1.74	0.17		
Lack of emotional clarity	104	12.67 (3.18)	12.07 (2.88)	2.16*	0.21		
RRS							
Reflective pondering	105	23.60 (4.36)	23.66 (5.02)	-0.15	0.02		
Moody pondering (brooding)	105	12.42 (2.50)	11.92 (2.88)	1.98	0.20		
SICBC							
Total	105	8.39 (2.96)	7.64 (3.24)	2.98**	0.29		
Dizzy	105	0.53 (0.59)	0.50 (0.62)	0.61	0.05		
Over-tired	105	1.54 (0.57)	1.37 (0.59)	2.95**	0.29		
Problems getting to sleep	105	0.94 (0.81)	0.82 (0.78)	1.79	0.17		
Problems getting up in the morning	105	1.49 (0.65)	1.42 (0.68)	1.47	0.15		
Aches/pains	105	0.86 (0.68)	0.71 (0.73)	1.99*	0.20		
Headaches	105	1.12 (0.69)	1.02 (0.68)	1.82	0.16		
Nausea/feeling sick	105	0.60 (0.66)	0.58 (0.64)	0.23	0.03		
Problems with eyes	105	0.28 (0.55)	0.34 (0.58)	-1.13	0.11		
Stomach aches	105	0.93 (0.67)	0.82 (0.69)	1.68	0.15		
Vomiting	105	0.10 (0.35)	0.07 (0.29)	0.82	0.11		

* Significant at $p < 0.05$ level
 **Significant at $p < 0.01$ level
[†] PANAS (Positive and Negative Affect Schedule); DERS (Difficulties in Emotion Regulation Scale); RRS (Ruminative Response Scale); SICBC (Somatization Index of the Child Behavior Checklist)
[‡] Effect size measured by Cohen's d: 0.20 small, 0.50 medium, 0.80 large

of calmness, relaxation and self-acceptance compared to controls. There was also an increase among program participants in emotion regulation after program completion. Students indicated greater awareness of their feelings as they were being experienced. They also reported being clearer about the specific emotions they experienced. These findings suggest that this program may be an effective way to teach students to use mindfulness to manage negative emotions and to understand thoughts and feelings.

Within the treatment group, students reported significant overall reductions in tiredness and decreases in aches and pains from pre-test to post-test. Process evaluation indicated that approximately two-thirds of the participants practiced mindfulness techniques outside of class. Of this group, those who practiced more frequently reported feeling more tired and dizzy than those who practiced less frequently. This finding is difficult to interpret, because students were not asked to

TABLE 4 Qualitative Process Evaluation of BREATHE for Treatment Group Participants (N = 108)

Variable [†]	N	Mean	SD
Program Component			
Body scan	107	7.46	2.58
Meditation practice	106	7.92	2.17
Mindful movement practice	97	6.63	2.59
Loving-kindness meditation	100	6.60	2.38
Class discussion	107	5.37	2.35
Specific class activities/exercises:			
Acting out thoughts	92	6.25	2.43
Music and emotions	88	7.02	2.29
Self-compassion exercise	100	6.17	2.19
Top ten list	68	6.44	2.28
Workbook	99	4.15	2.41
CDs	102	6.91	2.71
Quality of Instructor	108	9.44	1.22
Overall Satisfaction with BREATHE Program	104	7.89	1.93

[†]Each item measured on a scale of 0 (least useful/satisfied) to 10 (most useful/satisfied)

describe the specific nature of the mindfulness practice performed outside of class. In class discussions, students had reported that the experience of being still helped them notice their chronic levels of fatigue. This might help explain the increase in feeling over-tired in the frequent-practice group, but it is unclear why dizziness also increased in this group. More specific detail on the nature of at-home practice is needed to answer these questions.

Overall, participants were satisfied with the program, primarily because it helped them learn how to let go of distressing thoughts and feelings in order to manage stress. One student's comment captured the theme of empowerment noted by the majority of respondents.

'I learned that I can control the way I react to things and that nothing is too overwhelming for me to handle.'

The results of this pilot study are promising but preliminary. Its limitations and unexplored questions, however, offer an opportunity for further study in order to advance understanding about the most effective ways to facilitate emotion regulation skills in adolescents.

First, this study relied on a relatively homogeneous student sample. Further research is needed to explore the generalizability of this program to other groups differing in gender, ethnicity and social class. The program curriculum was designed to be adapted for younger adolescents by varying activities and adjusting the presentation level. It would be helpful for future studies to assess its effectiveness for younger groups.

Second, the use of juniors as the control group raises the possibility that seniors might have benefited from the program because of their increased cognitive and emotional maturity. Attrition in the control group also may have artificially inflated treatment effects. Future studies should attempt to provide more robust control groups or employ a waiting-list control design if it is possible within the constraints of the school curriculum.

Third, it is important to investigate the skills that teachers need in order to offer this program effectively. It is our contention that instructors should have training in mindfulness practices, but whether this is a necessary condition for program effectiveness needs to be examined.

Fourth, the relatively short duration of the program raises the question of whether gains persist after its completion. It is likely that gains would be enhanced with on-going opportunities to practice mindfulness skills. This could take the form of booster sessions or

other forms of contemplative practices infused within the curriculum. Long-term follow-up studies could clarify this question.

Lastly, research with adults has found that additional cognitive and affective skills such as attention, concentration, empathy and creativity can be cultivated by meditative training. These are skills central to the goals of education. Examination of the connections between mindfulness training and student attention, achievement, and peer relationships, in addition to emotion regulation, would therefore provide important information about the significance of mindfulness skills as protective factors for adolescents. It is unlikely that a short program would have a significant impact on these areas without additional practice. Benefits accrued from participation in this program might be amplified if contemplative, reflective practices were encouraged in other areas of students' academic and personal lives. Such practices might be useful as part of an expanded program of mental health in schools.

As we have indicated, mindfulness and contemplative approaches have been received enthusiastically by researchers and practitioners because of demonstrated effectiveness in improving the lives of adults. The work of bringing mindfulness to children and adolescents in schools is just beginning. A growing evidence base suggests that childhood and adolescence are critical points for prevention and risk reduction. Helping young people manage effectively the stresses they will surely face by strengthening their capacity for emotion regulation is a potentially promising way of actively promoting their well-being.

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