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Changing Minds: A Pilot Feasibility Study of Mindfulness Training for At-Risk Adolescents

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Abstract

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Youth at risk for negative health outcomes due to reduced access to social, mental health, and educational support systems are in particular need of resources promoting social-emotional resilience and positive educational outcomes. A growing body of research documents the positive benefits of mindfulness-based interventions (MBIs), but few studies have examined the impact of MBIs for at-risk adolescents, particularly in school settings where barriers to access can be minimized. This pilot feasibility study examined the effects of a nine-week school-based MBI, augmented by cross-course curricular material, in a group of high school students attending a transfer school, designed to re-engage students who have dropped out or fallen behind in credits (N = 63). Pre- and post- MBI, students completed self-report measures of attention control, trait anxiety, coping, and emotion regulation, and attendance and academic achievement records were obtained from the school. Findings showed that the MBI promoted social-emotional resilience over the course of the semester. Moreover, students who took part in the science curriculum component of the program showed a trend for improved academic performance. Findings are discussed in terms of the potential for school-based MBIs to promote positive outcomes in at-risk youth.

Keywords

contemplative education, at-risk adolescents, mindfulness, resilience

Cover Page Footnote

Author Note The Changing Minds program was implemented in collaboration with Concord High School's Principal, Ron Gorsky, and the staff and teachers, including Antonia Prescia, Glen Ladner, Leslie Chow, and Kim Wilson-Hite. And of course, the enterprising students. Special thanks to Peter Barton, a veteran documentary filmmaker, with three Emmy nominations and three CINE Golden Eagle awards to his credit. More information about the project and documentary, Changing Minds at Concord High, can be found at changingmindsprogram.org. Correspondence concerning this article should be addressed to Tracy A. Dennis, Department of Psychology, Hunter College, The City University of New York, 695 Park Ave., New York, NY 10065 E-mail: tracy.dennis@hunter.cuny.edu

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1. Introduction

Adolescence, a period marked by rapid biological, emotional, and social changes (Somerville et al., 2010), represents a time of both unique risk and opportunities (Dahl, 2004). This "perfect storm" of neurobehavioral vulnerabilities combined with external challenges and stressors has led many to characterize adolescence, by definition, as a period of heightened distress (Spear, 2000) and of difficulties in the regulation of emotions and behavior (Silvers et al. 2012). For example, one in five children and adolescents suffer from social-emotional and behavioral problems, creating heightened risk for school failure and poor social-emotional outcomes (Health, 2000). Moreover, the incidence of psychiatric illnesses, emotional distress, and risky behaviors greatly increases from childhood to adolescence (Compas et al., 1993; Kessler et al., 2005; Steinberg, 2007). Although a "storm and stress" view of adolescence (Hall, 1904) is controversial, these increases in signs of maladjustment during adolescence mark this developmental period as a powerful window of opportunity for the provision of interventions that strengthen self-regulatory abilities (Dahl, 2004).

Disadvantaged adolescents are at even greater risk for negative life outcomes because they have reduced access to social, mental health, and educational support systems (Bringewatt & Gershoff, 2010; McLeod et al., 2012). School-based interventions have provided some of the most promising and beneficial effects for at-risk youth (Bernstein et al., 2005; Durlak et al., 2011; Wilson & Lipsey, 2007) but more needs to be understood about effective methods to reduce emotional and behavioral problems, and build resilience in youth who face significant adversity (McLaughlin & Hatzenbuehler, 2009). Thus, it is crucial for educators and mental health professionals to develop a range of school-based interventions that promote resilience, and reduce stress and emotional distress in youth already at risk for poor mental health and educational outcomes. Such interventions should aim to provide youth with strategies to regulate their attention and emotions in their personal lives (Goodman et al., 2013; Graham-Bermann & Seng, 2005; Ryan, 2013).

A growing field of research points to the potential for mindfulness-based techniques to promote social-emotional competence and positive educational outcomes in youth. In this paper, we describe a pilot project examining the feasibility and initial resilience-promoting effects – emotional, social, and cognitive – of a nine-week, mindfulness-based program incorporated into the classroom in a group of at-risk adolescents. We also examine the pedagogical effects of including a group of students as research assistants on the study – that is, we tested whether these students showed improved academic outcomes over the course of the study.

1.1 Mindfulness

Mindfulness refers to the non-elaborative and non-judgmental awareness of the present moment. It allows the subject to increase cognizance of his or her thoughts, feelings, and actions without labeling them as good, bad, right, or wrong (Kabat-Zinn, 2003). Training in mindfulness integrates a variety of meditation practices that support the development of health-related and wellbeing outcomes, including focused attention (FA) meditation, Open Monitoring (OM) meditation, body scan, and light Hatha yoga. Through these meditation practices, it is proposed that psychological skills underlying self-awareness, self-regulation, and prosocial forms of behavior are developed along with non-propositional meta-awareness of the environment (Baer, 2003; Vago & Silbersweig, 2012). Mindfulness based interventions (MBIs), modelled on the core curriculum of Mindfulness-Based Stress Reduction (MBSR) incorporate mindfulness training skills into therapeutic practice, educational curriculae, and programs to promote mental health (Baer, 2003). In fact, empirical evidence increasingly points to the potential for MBIs to strengthen a range of core capacities that support clinical health and positive adjustment (Goyal et al, 2014; Sedlmeier, et al., 2012). Furthermore, an extensive review of MBIs offered in schools revealed that the positive effects of in-school mindfulness trainings paralleled the benefits obtained from MBIs offered in clinical settings and also asserted the potential for mindfulness skills to promote academic, social-emotional, and behavioral improvements (Klingbeil et al, 2017).

Mindfulness training shapes the cognitive environment in which individuals learn about the world around them. Echoing the self-awareness, -regulation, and -transcendence (S-ART) conceptualization of mindfulness proposed by Vago and Silbersweig (2012), present-focused attention cultivated through mindfulness practices is theorized to not only promote increased self-awareness but also develop one's ability to effectively self-regulate behaviors. They further assert that, via a series of interrelated neurocognitive mechanisms, such mental training may also facilitate bias reduction, potentially restoring balance to dysregulated systems that differentially processes emotional versus neutral stimuli. The training used in this pilot feasibility study explores the efficacy of employing a Mindfulness-based FA training to improve attentional control skills and enhance resilience. The relationship between mindfulness and resilience outcomes has been mentioned in research theorizing that mindfulness meditation practice improves equanimity. Equanimity, or "an even and unbiased" (Desbordes et al., 2014, p. 358) awareness, is related to mindfulness in that one must be aware of the present moment in order to develop the skills to react non-judgmentally. Equanimity is proposed to affect the response time of an individual's response to stressors. Therefore, resilience, or the quick ability to recover from stressors, is likely to be related to mindfulness meditation practice through enhanced

equanimity skills (Desbordes et al., 2014). We also aim to encourage a perceptual shift towards understanding that, as experiences are continually changing, a healthy way to conceptualize and react to this change is through flexible awareness (Ivanovski & Malhi, 2007).

MBIs have also been shown to bolster emotion regulation (Baer, 2012; Brown et al., 2013; Goldin et al., 2009; Robins et al., 2012) and to improve executive attention (Flook et al., 2010; Jha et al., 2007; Zeidan et al., 2010), which are core building blocks of the ability to respond flexibly and adaptively to stress and challenges. This capacity is especially beneficial to the mental health of developing youths (Tang et al., 2012).

Neurodevelopmental research among adolescents has shown, for example, that, compared to adults, greater activation of regions of the prefrontal cortex - associated with executive functioning, attentional control, and emotion regulation – is required to support comparable levels of performance. These cognitive differences become even more stark during periods of heightened distress, as they can hinder not only adolescent emotion regulation, but also decision-making. The neurodevelopmental vulnerabilities during adolescence become even more pronounced for at-risk teens.

These differences highlight a vulnerability associated with adolescence in particular and positions mindfulness trainings, shown to enhance executive function, as a potentially efficacious tool for mitigation of the attentional control and emotion regulation challenges often characteristic of adolescence (Sanger & Dorjee, 2015). Moreover, boosting emotional and behavioral regulatory capacities in children predicts positive educational outcomes, such as school readiness (Blair & Diamond, 2008). Indeed, emotion regulation in particular has been implicated as a potential mechanism through which MBIs promote positive mental heath outcomes (Kropp & Sedlmeier, 2019).

MBIs have also been shown to remediate anxiety symptoms. A number of meta-analyses have demonstrated that MBIs are effective in improving emotion and mood symptoms in individuals with clinical levels of anxiety and mood disorders (Hofmann et al., 2010; Hoge et al., 2020) and in sub-clinical populations in comparison to active control interventions (Goyal et al., 2014). MBSR programs have provided evidence indicating lower clinical levels of social anxiety in adults (Goldin & Gross, 2010), stress (Chiesa & Serretti, 2009), and depression (Bohlmeijer et al., 2010). Similarly, state and trait mindfulness has been associated with positive emotional states (Brown & Ryan 2003) and the reduction of emotional distress via decreases in negatively biased cognition (Kiken & Shook, 2012). Taken together, research to date suggests that MBIs reduce stress, anxiety, depression, and foster aspects of executive attention, emotion regulation and cognitive control, and induces neurobiological changes in the systems that support these capacities.

1.2 Mindfulness During Adolescence

Due to the positive benefits of MBIs, mindfulness training could be beneficial to at-risk adolescents, who experience notably higher rates of community violence, youth delinquency, drug abuse, incarceration, and pregnancy, leading to high stress, poor academic performance, and negative health outcomes (Gorman-Smith & Tolan, 1998; Mendelson et al., 2010). Schools serving the needs of at-risk youth have a particular responsibility to promote students' positive coping skills and capacities such as emotion regulation, behavior regulation, and executive functions that have the potential to enhance resilience and positive coping. Nurturing mindfulness in children and adolescents has been associated with a range of mental health benefits (Broderick & Jennings, 2012; Greenberg & Harris, 2012), including reduced anxiety (Semple et al., 2010) and increases in teacher-rated attention, social skills, and calmness (Flook et al., 2010; Napoli et al., 2005; Semple et al., 2005; Wall, 2005). Importantly, teachers have reported on the low burden and relative ease of integrating basic mindfulness exercises into class time (Schonert-Reichl & Lawlor, 2010).

Improvements in anxiety, social skills, and attention have been found in a wide range of adolescent samples that have participated in MBIs (Beauchemin et al., 2008; Biegel et al., 2009; Bögels et al., 2008). Mindfulness training in adolescents has also been associated with increases in emotional and social competence (Schonert-Reichl & Lawlor, 2010). Yet, few studies have examined the benefits of MBIs in at-risk youth and in secondary school settings (Campbell et al., 2019). One study incorporated a 12-week mindfulness and yoga intervention for disadvantaged elementary school students in an urban community. From pre- to post-intervention, the children who participated in the intervention group compared to those in a waitlist control group reported reductions in involuntary stress reactions, rumination, intrusive thoughts, and emotional arousal (Mendelson et al., 2010). In another study with adolescents, a six-week mindfulness training program focusing on the cultivation of emotional balance resulted in less negative affect and greater self-acceptance and effective emotion regulation. This program taught students to BREATH: an acronym that that covers six themes of mindfulness, such as body awareness and reducing self-judgment (Broderick & Metz, 2009). Another recent study incorporated Learning to BREATHE, the school-based mindfulness program developed based on MBSR, into an ethnically diverse high school with a high proportion of at-risk adolescents. The results suggested that students in the MBI group experienced a stabilizing effect of psychosocial resilience while those in the control group experienced a decline of psychosocial resilience (Felver et al., 2019).

These promising early results point to the possibility that in youth at risk, initial learning of mindfulness techniques may in and of itself promote resilience, although long-term benefits may be more likely to emerge with extensive training

and use of these techniques (Greenberg & Harris, 2012). Lastly, these results point to the critical need for additional studies examining the feasibility and efficacy of MBIs for at-risk adolescents.

1.3 The Present Study

The present study reports on a pilot feasibility trial of a classroom-based mindfulness training program, based on the 8-week structure of a typical MBSR program, at a transfer alternative high school. Many MBIs have focused on adult populations, therefore this study's MBI was modified to be integrated within the culture of the high school classroom. The modified MBI introduced the inclusion of school teachers as mindfulness instructors and scripts were adapted to be more relevant to students. A transfer high school is designed to help meet the needs of at-risk students who had not responded well to the traditional high school experience. This pilot study aimed to explore the association between mindfulness and emotional resilience in at-risk youth and to assess whether it was feasible to implement a school-wide program that focused on brief, but formal meditation practice at an at-risk high school. We explored whether youth trained in mindfulness-based meditation, compared to control conditions, would show greater resilience, reduced negative outcomes, and/or more positive cognitive, social, and emotional outcomes: decreases in state and trait anxiety, increases in emotion regulation and attention control, and increases in the adaptive use of coping strategies in response to stressful events.

In addition, the pilot study integrated an applied scientific research curriculum. A group of students from the high school's science course were chosen to act as research assistants in the study. As research assistants, they were taught about the science of mindfulness, basic psychological principles and neuroscience, obtained questionnaire data, and kept a video log in which they recorded their thoughts and reactions to this new experience. To explore the potential benefits of these pedagogical changes, we tested whether youth acting as research assistants on the project would show positive educational effects (improved attendance and grades), as this hands-on learning would not only contribute to a better understanding of the application of mindfulness to daily living, but perhaps increase learning engagement and motivation as measured by grades and school attendance.

2. Method

2.1 Participants

Participants ($N = 63$) included adolescents from a transfer high school. A transfer high school is designed the re-engage students who have previously dropped out or fallen behind; students must be 15 to 21 years old and have completed at least one year of high school. Gender and age information is missing for one participant; of the remaining 62 participants there were 34 females and 28 males with ages ranging from 16 to 21 ($M = 17.65$, $SD = 1.13$). Participants were

assigned into the experimental (mindfulness) group (n = 30), the active control (quiet relaxation) group (n = 17), or the passive control group (no training; n = 16). A further 14 students (8 males and 6 females) acted as research assistants for the study. They aged from 18 to 20 (M = 18.85, SD = 0.80). School demographics indicate that 31% of the student population was African American, 34% Latino, and 35% White.

2.2 Procedure

Prior to the study, parents were advised about the program via a newsletter and the school held a practice session for interested parents at an evening session at the school. Students were told that the school was running a research experiment to see if a certain practice could help the students to learn better. The experimental group received mindfulness-based training five times per week for nine weeks; students were told that they could follow the instructions and practice or that they could opt out and remain silent during the training. Students were given the option to opt out to ensure the intervention was voluntary and did not act as a deterrent to attend class. Each meditation session lasted for three minutes. The active control group did not receive any training, but were asked to sit still and quietly relax for three minutes, five times per week for nine weeks. Students in the passive control group did not receive any training. All participants completed questionnaires assessing anxiety, emotion regulation, attentional control, and coping before and after the nine-week training session by the research assistant students. Data analysis was conducted by the authors with a series of mixed-design ANOVAs and correlations using IBM SPSS version 20.

2.3 Brief Mindfulness-Based Focused Attention Training

The meditation training sessions, administered over the course of nine-weeks, were meant to introduce students to the concept and techniques of mindfulness and to provide a time in their day in which they could practice these techniques. A focused attention, mindful breathing meditation was the core practice. The high school teachers practiced the meditation themselves for a few sessions, were subsequently trained to conduct the mindfulness sessions with the students, and then were given a script to read aloud to initiate each session. They were asked to read each script in a gentle, soothing voice. For example, Week 2 of training began by the reading of the script below:

> "So, we sit as straight as we can, hands on our legs, or in our lap, feet on the floor. And we watch our breathing, nothing else. Not too tense, not too loose. Then some thoughts may come, and any number of distractions: things you talked about yesterday, movies you watched last week, a conversation you just had, someone may come into the class late…All of this may happen, and if it does, don't judge it. Just go back to the breathing. This is the slogan of mind training instruction: just come back. Every time we notice that we've gotten distracted, we remember the

> instruction and we gently come back to the breath. We bring the mind back home. Let's do this for a while."

The short mindful breathing induction script varied each week in order to keep the practice interesting for the students and to address questions, or misconceptions that the students voiced during the course of the week. However, sitting up straight, being present, and refocusing one's attention to the breath for three minutes were universal themes among the nine scripts. Each meditation session began and ended with the sound of a digital bell.

2.4 Measures

2.4.1 Trait anxiety. Trait anxiety was measured using the State-Trait Anxiety Inventory (STAI) (Spielberger, 1983). The trait anxiety subscale consists of 20 items in which participants report on how they generally feel with questions such as, "I am a steady person" and "I feel nervous and restless." Responses are made on a four-point Likert scale (1: almost never; 2: sometimes; 3: often; 4: almost always). A higher score indicates higher levels trait anxiety.

2.4.2 Emotion regulation. The Cognitive Emotion Regulation Questionnaire (CERQ) (Garnefski & Kraaij, 2007) is a 36-item questionnaire that measures nine cognitive emotion regulation strategies: self-blame, blaming others, acceptance, refocusing on planning, rumination, positive appraisal, putting into perspective, and catastrophizing. It asks participants how they respond to negative events with questions such as, "I think that basically the cause must lie within myself" (self-blame) and "I think I can learn something from the situation" (positive appraisal). Responses are made on a five-point Likert scale (1: almost never; 2: sometimes; 3: regularly; 4: often; 5: almost always). A higher score indicates more frequent use of the particular emotion regulation strategy.

2.4.3 Attentional control. Attentional control was measured by the Attentional Control Scale (ACS) (Derryberry & Reed, 2002). This 20-item questionnaire measures two types of attentional control, focusing and shifting, with items such as, "I have a hard time concentrating when I'm excited about something" (attentional focusing) and "It is easy for me to alternate between two different tasks" (attentional shifting). Responses are made on a four-point Likert scale (1: almost never; 2: sometimes; 3: often; 4: always). Higher scores indicate better attentional control.

2.4.4 Coping strategies. The COPE Inventory (COPE) (Carver et al., 1989) is a 60-item questionnaire that measures thirteen coping strategies: positive reinterpretation and growth, mental disengagement, focus on and venting of emotions, use of instrumental social support, active coping, denial, religious coping, humor, behavioral disengagement, restraint, use of emotional social support, substance use, acceptance, suppression of competing activities, planning. Participants respond on a four-point Likert scale (1: I usually don't do this at all; 2: I usually do this a little bit; 3: I usually do this a medium amount; 4: I usually

do this a lot) to questions such as, "I discuss my feelings with someone" (use of emotional social support) and "I try to come up with a strategy about what to do" (planning). Higher scores indicate more frequent use of the particular coping strategy.

2.4.5 Attendance and grades. Attendance and average course grades were collected for all students (participants and research assistants) before and after the study was conducted. Grades were calculated as the average for all classes each student took.

2.4.6 Missing responses. Missing responses were replaced with the average value of the remaining items in the subscale. The number of replaceable missing responses was based on the number of items in the subscale: the COPE and CERQ (4 items in each subscale) could have one missing response, the ACS (9 and 10 items in each subscale) could have two missing responses, and the STAI (20 items in the scale) could have three missing responses. If more responses than these amounts were present the scale was discarded for that participant. Each scale was only included in analyses if there was both a pre- and post-training value (see Table 1 for sample sizes for each questionnaire scale).

3. Results

Table 2 presents descriptive statistics of pre- and post-training questionnaire subscales for the experimental, active control, and passive control groups.

3.1 Effects of Brief Mindfulness-Based Intervention on Self-Report of Trait Anxiety, Emotion Regulation, Coping and Attention Control

We predicted that youth in the mindfulness-based training, compared to active and passive control groups, would show decreases in trait anxiety, increases in emotion regulation and attentional control, and increases in the adaptive use of coping strategies in response to stressful events, compared to the passive control and active control group. To test this prediction, a 2(Assessment: pre-training, post-training) x 3(Condition: experimental, active control, passive control) mixed-design ANOVA was conducted with Assessment as a within-subjects factor and Condition as a between-subjects factor separately for each questionnaire subscale.

There was a significant interaction between Assessment and Condition on trait anxiety, $F(2, 48) = 4.59$, $p = .02$, partial $\eta^2 = .16$ (see Figure 1). This effect indicated that while there were no differences between the conditions before training, participants in the passive control condition showed increases in trait anxiety from pre-training ($M = 45.47$, $SD = 8.66$) to post-training ($M = 54.47$, $SD = 9.81$), $t(13) = -2.41$, $p = .03$. No such increases occurred in either the experimental or active control condition. At the post-training assessment, both the experimental ($M = 44.29$, $SD = 8.55$) and the active control conditions ($M = 42.60$, $SD = 6.17$) had lower trait anxiety than the passive control condition ($M = 53.29$, $SD = 9.45$) [experimental: $t(37) = -3.24$, $p = .002$; active control: $t(24) = -3.62$, $p = .001$]. No other significant effects emerged.

To determine whether there were any further differences between the experimental and active control group, and given this key finding for trait anxiety, we conducted a series of correlations between change in trait anxiety scores (pre- to post-training) and change in measures of emotion regulation, attention control, and coping separately for each group. For the experimental group, decreases in trait anxiety were associated with *decreases* in less adaptive coping strategies [behavioral disengagement (r = .53, p = .006), self-blame (r = .41, p = .04), and other-blame (r = .73, p < .001; see Figure 2)] and *increases* in adaptive coping and emotion regulation [planning (r = -.47, p = .02) and reappraisal (r = -.50, p = .01; see Figure 3)]. Importantly, there were no significant associations for reductions in trait anxiety and coping/emotion regulation in the active control group.

3.2 Attendance and Grade Outcomes

We predicted that students in the experimental group and those acting as research assistants would show improved attendance records and average course grades. To test this prediction for participants, a 2(Assessment: pre-training, post-training) x 3(Condition: experimental, active control, passive control) mixed-design ANOVA was conducted with Assessment as a within-subjects factor and Condition as a between-subjects factor separately for attendance and grades. No significant effects emerged.

To test this prediction for research assistants, paired samples t-tests were conducted to compare pre- and post-study attendance and grades. Average course grades showed increases from pre-training (M = 70.12, SD = 7.09) to post-training (M = 75.82, SD = 9.82), $t(13)$ = -2.03, p = .06, at the level of a trend. There was no significant effect for attendance.

4. Discussion

The present study explored changes in anxiety, emotion regulation, coping strategies, and attentional control following nine weeks of a brief mindfulness-based focused attention intervention in a group of at-risk adolescents. Although mindfulness training sessions were only 3 minutes long, results provide suggestive evidence that even this very brief use of mindfulness techniques promotes emotional resilience in at-risk adolescents. This study also provides initial evidence of the feasibility of teaching simple mindfulness techniques in a classroom of adolescents at elevated risk for a host of social, behavioral, and emotional problems. Findings set the stage for future research on the integration of mindfulness training in education, with greater need to understand the unique factors that might influence the efficacy of mindfulness training in adolescents experiencing a range of social and emotional stressors.

Our primary finding highlights the potential for mindfulness to promote emotional resilience. Specifically, we found that adolescents assigned to the passive control group showed sharp *increases* in trait anxiety over the course of

the nine-week study, whereas adolescents in both the mindfulness and active control (simply sitting) conditions showed no change in trait anxiety. Moreover, follow-up analyses revealed differences between the mindfulness and active control groups. For the mindfulness group only, decreases in trait anxiety were associated with decreases in negative coping and emotion regulation strategies and increases in positive emotion regulation strategies. This suggests that while the mindfulness and active control groups showed similar patterns of emotional resilience through reduced trait anxiety, adolescents learning mindfulness techniques may experience a greater beneficial impact by improving their coping and emotion regulation capacities as well. Consistent with this, a recent study of a high-stress population, pre-deployment U.S. Marines, demonstrated that mindfulness interventions can promote resilience in ways that bolster general coping with stress (Stanley et al., 2011). For U.S. Marines who completed Mindfulness-Based Mind Fitness Training (MMFT) before deployment, greater self-reported mindfulness was associated with decreased perceived stress. Taken together, these findings suggest that providing at-risk populations, such as adolescents or high-stress individuals, with brief training in mindfulness techniques may promote a stronger ability to cope with and regulate emotional reactions in the face of stress.

It is interesting that both the mindfulness and active control groups demonstrated a protective effect against rising trait anxiety levels. While the passive control group showed increases in anxiety over the nine weeks, trait anxiety levels remained stable for both the mindfulness and active control group. The nature of the active control may have influenced this result, as the three minutes of quiet relaxation time gave students a break in their day to release the anxieties and stresses of the morning. It is also important to consider whether classroom-based interventions in which students have time to sit in silence, regardless of content, may provide adolescents with some level of resiliency against stress.

Critically, while this resiliency effect was present for both the mindfulness and active control groups, linkages between decreases in trait anxiety over the nine-week training period and more adaptive emotion regulation and coping strategies and attentional control emerged only for the mindfulness group. Specifically, participants who showed larger decreases in anxiety showed less endorsement of behavioral disengagement, or the tendency to give up or put in less effort on achieving goals, and less of a tendency to assign responsibility for negative events to themselves or others (blame). Additionally, these participants also showed a greater ability to think ahead about coping strategies for negative situations (planning) and to find the positive in a negative situation (reappraisal). Taken together, these findings are consistent with studies demonstrating that mindfulness interventions reduce emotional distress (Kiken & Shook, 2012), improve emotion

regulation skills (Baer et al., 2012; Robins et al., 2012) and cognitive flexibility (Feldman et al., 2007), and that even brief interventions enhance cognition (Zeidan et al., 2010).

One limitation of the present study also represents what we believe is a programmatic strength. Adolescents from the target high school who did not act as study participants acted as the research assistants for this study. They were responsible for administering the questionnaires, entering the data, and debriefing their classmates following the study. While this approach may have led to less carefully controlled experimental conditions, the pedagogical nature of the design – involving students in the research process – has value as well. These students showed an increase in grade point average from pre- to post-training at the level of a trend. In addition to empowering students to design and execute a scientific project, the sense of investment and ownership over this program facilitated the growth of a "culture of mindfulness" in the school. While a follow-up post-intervention was not conducted, there were indications that the administration and students alike found the program to be valuable past the post-intervention. For example, following the study, the school spontaneously created a "meditation garden" and several teachers initiated a syllabus change to include academic material related to the idea of mindfulness and relaxation, such as reading Siddharth. This shift in the larger "culture" of the school may be part and parcel of increasing both the potential effectiveness of mindfulness training and increase social-support and stress reduction resources.

Additionally, the lack of additional findings could be due to the design of the study itself. Future research should incorporate an empirically studied mindfulness program into the course curriculum of students, randomly assigned to each condition, with trained staff to conduct the mindfulness sessions. More stringent research methods should be used in order to fully grasp the effects of the program on the mental health of at-risk adolescents. Furthermore, it will be important for future studies to disambiguate the differences between training the students and the teachers and the differences in outcomes after training the students and teachers uniquely, or training both groups.

The growing interest in MBIs indicates that there also is an interest in developing simple, cost efficient, and effective interventions within the field of mental health. Findings of the present feasibility study suggest that a mindfulness-based meditation program can indeed be implemented in the classroom, and that even brief, daily meditation practice can have positive-reaching effects. Mindfulness holds much promise in psychological and educational science. Taken together, the present findings suggest that mindfulness-based programs may promote resilience to stress, perhaps via enhancing the use of positive coping and emotion regulation capacities, in at-risk adolescents. Developing mindfulness-based curriculae in the classroom have the potential to change the way educators

approach mental health in school, suggesting that a "mindful classroom" can facilitate the tools necessary to help students pay attention and get the most of their classroom experience. Given the short duration of each training session (3 minutes) the cost in terms of time and teacher resources may be well worth the benefit. Future studies should distinguish which mindfulness programs are best suited for reducing stress and increasing adaptive emotion regulation strategies in at-risk youth. Additionally, it should distinguish the effects of mindfulness training from those of simply relaxing. Mindfulness programs in education should be given to an array of youth to better understand how cultivating mindfulness affects psychological functioning, learning, and mental health across a wider range of socioeconomic groups and throughout the lifespan.

References

Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice 10*(2), 125-143. doi:10.1093/clipsy.bpg015

Baer, R. A., Carmody, J., & Hunsinger, M. (2012). Weekly change in mindfulness And perceived stress in a mindfulness-based stress reduction program. *Journal of Clinical Psychology, 68*(7), 755-765. doi: 10.1002/jclp.21865

Beauchemin, J., Hutchins, T. L., & Patterson, F. (2008). Mindfulness Meditation May Lessen Anxiety, Promote Social Skills, and Improve Academic Performance Among Adolescents With Learning Disabilities. *Complementary Health Practice Review, 13*(1), 34-45. doi:10.1177/1533210107311624

Bernstein, G., Layne, A., Egan, E., & Tennison, D. (2005). School-based interventions for anxious children. *Journal of the American Academy of Child & Adolescent Psychiatry, 44*(11), 1118-1127. doi:10.1097/01.chi.0000177323.40005.a1

Biegel, G., Brown, K. W., Shapiro, S., & Schubert, C. (2009). Mindfulness-based stress reduction for the treatment of adolescent psychiatric outpatients: a randomized clinical trial. *Journal of Consulting and Clinical Psychology, 77*(5), 855-866. doi: 0.1037/a0016241

Blair, C., & Diamond, A. (2008). Biological processes in prevention and intervention: the promotion of self-regulation as a means of preventing school failure. *Developmental Psychopathology, 20*(3), 899-911. doi: 10.1017/s0954579408000436

Bögels, S., Hoogstad, B., van Dun, L., de Schutter, S., & Restifo, K. (2008). Mindfulness training for adolescents with externalizing disorders and their parents. *Behavioural and Cognitive Psychotherapy, 36*(02), 193-209. doi:10.1017/S1352465808004190

Bohlmeijer, E., Prenger, R., Taal, E., & Cuijpers, P. (2010). The effects of mindfulness-based stress reduction therapy on mental health of adults with a chronic medical disease: a meta-analysis. *Journal of Psychosomatic Research, 68*(6), 539-544. doi: 10.1016/j.jpsychores.2009.10.005

Bringewatt, E. H., & Gershoff, E. T. (2010). Falling through the cracks: Gaps and barriers in the mental health system for America's disadvantaged children. *Children and Youth Services Review, 32*(10), 1291-1299. doi: dx.doi.org/10.1016/j.childyouth.2010.04.021

Broderick, P. C., & Jennings, P. A. (2012). Mindfulness for adolescents: a promising approach to supporting emotion regulation and preventing risky behavior. *New Directions for Youth Development, 2012*(136), 111-126. doi: 10.1002/yd.20042

Broderick, P. C., & Metz, S. (2009). Learning to BREATH: A pilot trial of a mindfulness curriculum for adolescents. *Advances in School Mental Health Promotion, 2*(1), 35-46.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822-848.

Brown, K. W., Goodman, R. J., & Inzlicht, M. (2013). Dispositional mindfulness and the attenuation of neural responses to emotional stimuli. *Social Cognitive and Affective Neuroscience, 8*(1), 93-99. doi: 10.1093/scan/nss004

Cahn, B. and Polich, J. (2006). Meditation states and traits: EEG, ERP, and neuroimaging studies. *Psychological Bulletin, 132*(2), 180-211.

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: a theoretically based approach. *Journal of Personality and Social Psychology, 56*(2), 267-283.

Chiesa, A., & Serretti, A. (2009). Mindfulness-based stress reduction for stress management in healthy people: a review and meta-analysis. *Journal of Alternative and Complementary Medicine, 15*(5), 593-600. doi: 10.1089/acm.2008.0495

Chiesa, A., & Serretti, A. (2010). A systematic review of neurobiological and clinical features of mindfulness meditations. *Psychological Medicine, 40*(8), 1239-1252. doi:10.1017/s0033291709991747

Compas, B. E., Orosan, P. G., & Grant, K. E. (1993). Adolescent stress and coping: implications for psychopathology during adolescence. *Journal of Adolescent Health, 16*(3), 331-349. doi:10.1006/jado.1993.1028

Dahl, R. E. (2004). Adolescent brain development: a period of vulnerabilities and opportunities. Keynote address. *Annals of the New York Academy of Sciences, 1021*, 1-22. doi: 10.1196/annals.1308.001

Derryberry, D., & Reed, M. A. (2002). Anxiety-related attentional biases and their Regulation by attentional control. *Journal of Abnormal Psychology, 111*(2), 225- 236.

Desbordes, G., Gard, T., Hoge, E. A., Hölzel, B. K., Kerr, C., Lazar, S. W., Olendzki, A., & Vago, D. R. (2014). Moving beyond mindfulness: defining equanimity as an outcome measure in meditation and contemplative research. *Mindfulness*, *2014*(January), 356–372. https://doi.org/10.1007/s12671-013-0269-8

Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: a meta-analysis of school- based universal interventions. *Child Development, 82*(1), 405-432. doi: 10.1111/j.1467-8624.2010.01564.x

Eberth, J. and Sedlmeier, P. (2012). The effects of mindfulness meditation: A meta-analysis. *Mindfulness*, 3(3),174-189.doi:10.1007/s12671-012-0101.x

Feldman, G., Hayes, A., Kumar, S., Greeson, J., & Laurenceau, J.-P. (2007). Mindfulness and emotion regulation: The development and initial validation of the cognitive and affective mindfulness scale-revised (CAMS-R). *Journal of Psychopathology and Behavioral Assessment, 29*(3), 177-190. doi: 10.1007/s10862-006-9035-8

Joshua C. Felver, Adam J. Clawson, Melissa L. Morton, Erica Brier-Kennedy, Pamela Janack & Robert A. DiFlorio (2019) School-based mindfulness intervention supports adolescent resiliency: A randomized controlled pilot study. *International Journal of School & Educational Psychology*, 7:sup1, 111-122, doi: 10.1080/21683603.2018.1461722

Flook, L., Smalley, S. L., Kitil, M. J., Galla, B. M., Kaiser-Greenland, S., Locke, J., Kasari, C. (2010). Effects of mindful awareness practices on executive functions in elementary school children. *Journal of Applied School Psychology, 26*(1), 70-95. doi:10.1080/15377900903379125

Garnefski, N., & Kraaij, V. (2007). The cognitive emotion regulation questionnaire: psychometric features and prospective relationships with depression and anxiety in adults. *European Journal of Psychological Assessment, 23*(3), 141-149. doi:10.1027/1015-5759.23.3.141

Goldin, P. R., Ramel, W., & Gross, J. J. (2009). Mindfulness meditation training and self- referential processing in social anxiety disorder: Behavioral and neural effects. *Journal of Cognitive Psychotherapy: An International Quarterly, 23*(3), 242-257. doi:10.1891/0889-8391.23.3.242

Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*(1), 83-91. doi:10.1037/a0018441

Goodman, L. A., Pugach, M., Skolnik, A., & Smith, L. (2013). Poverty and mental health practice: within and beyond the 50-minute hour. *Journal of Clinical Psychology, 69*(2), 182-190. doi: 10.1002/jclp.21957

Gorman-Smith, D., & Tolan, P. (1998). The role of exposure to community violence and developmental problems among inner-city youth. *Developmental Psychopathology, 10*(1), 101-116.

Goyal, M., Singh, S., Sibinga, E. M., Gould, N. F., Rowland-Seymour, A., Sharma, R., Berger, Z., Sleicher, D., Maron, D. D., Shihab, H. M., Ranasinghe, P. D., Linn, S., Saha, S., Bass, E. B., Haythornthwaite, J. A., Cramer, H. (2014). Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. *Deutsche Zeitschrift für Akupunktur, 57*(3). 26-27.

Graham-Bermann, S. A., & Seng, J. (2005). Violence exposure and traumatic stress symptoms as additional predictors of health problems in high-risk children. *The Journal of Pediatrics, 146*(3), 349-354. doi: 10.1016/j.jpeds.2004.10.065

Greenberg, M. T., & Harris, A. R. (2012). Nurturing mindfulness in children and youth: Current state of research. *Child Development Perspectives, 6*(2), 161-166. doi:10.1111/j.1750-8606.2011.00215.x

Hall, S. (1904). *Adolescence: its psychology and its relations to physiology, anthropology, sociology, sex, crime, religion and education*. D. Appleton and Company.

US Department of Health and Human Services; US Department of Education; US Department of Justice. (2000) *Report of the Surgeon General's Conference on Children's Mental Health: A National Action Agenda.* Washington, DC Department of Health and Human Services. PMID: 20669515.

Hofmann, S., Sawyer, A., Witt, A., & Oh, D. (2010). The effects of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*(2), 169- 183. doi: 10.1037/a0018555

Hoge, E.A., Acabchuk, R.L., Kimmel, H. *et al.* Emotion-related constructs engaged by mindfulness-based interventions: A systematic review and meta-analysis. *Mindfulness* (2020). https://doi.org/10.1007/s12671-020-01561-w

Ivanovski, B., & Malhi, G. S. (2007). The psychological and neurophysiological concomitants of mindfulness forms of meditation. *Acta Neuropsychiatrica, 19*(2), 76-91. doi:10.1111/j.1601-5215.2007.00175.x

Jha, A., Krompinger, J., & Baime, M. (2007). Mindfulness training modifies subsystems of attention. *Cognitive, Affective, & Behavioral Neuroscience, 7*(2), 109-119. doi:10.3758/CABN.7.2.109

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice, 10*(2), 144-156. doi: 10.1093/clipsy.bpg016

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry, 62*(6), 593-602. doi:10.1001/archpsyc.62.6.593

Kiken, L. G., & Shook, N. J. (2012). Mindfulness and emotional distress: The role of negatively biased cognition. *Personality and Individual Differences, 52*(3), 329-333. doi: dx.doi.org/10.1016/j.paid.2011.10.031

Klingbeil, D. A., Renshaw, T. L., Willenbrink, J. B., Copek, R. A., Chan, K. T., Haddock, A., Yassin, J., & Clifton, J. (2017). Mindfulness-based interventions with youth: A comprehensive meta-analysis of group-design studies. *Journal of School Psychology*, *63*, 77-103. doi: 10.1016/j.jsp.2017.03.006.

Kropp, A., & Sedlmeier, P. (2019). What makes mindfulness-based interventions effective? An examination of common components. *Mindfulness*, *10*(10), 2060-2072. doi: 10.1007/s12671-019-01167-x

McLaughlin, K. A., & Hatzenbuehler, M. L. (2009). Mechanisms linking stressful life events and mental health problems in a prospective, community-based sample of adolescents. *Journal of Adolescent Health, 44*(2), 153-160. doi:dx.doi.org/10.1016/j.jadohealth.2008.06.019

McLeod, J. D., Uemura, R., & Rohrman, S. (2012). Adolescent mental health, behavior problems, and academic achievement. *Journal of Health and Social Behavior, 53*(4), 482-497. doi: 10.1177/0022146512462888

Mendelson, T., Greenberg, M., Dariotis, J., Gould, L., Rhoades, B., & Leaf, P. (2010). Feasibility and preliminary outcomes of a school-based mindfulness intervention for urban youth. *Journal of Abnormal Child Psychology, 38*(7), 985-994. doi:10.1007/s10802-010-9418-x

Davidson, R., Dunne, J., Eccles, J. S., Engle, A., Vago, D. (2012). Contemplative practices and mental training: Prospects for American education. *Child Development Perspectives, 6*(2), 146-153. doi: 10.1111/j.1750-8606.2012.00240.x

Moyer, C. A., Donnelly, M. P. W., Anderson, J. C., Valek, K. C., Huckaby, S. J., Wiederholt, D.A., Rice, B. L. (2011). Frontal electroencephalographic asymmetry associated with positive emotion is produced by very brief meditation training. *Psychological Science,22*(10), 1277-1279. doi: 10.1177/0956797611418985

Napoli, M., Krech, P., & Holley, L. (2005). Mindfulness training for elementary school students: The Attention Academy. *Journal of Applied School Psychology, 21*(1), 99-109. doi: 10.1300/J008v21n01_05

Robins, C., Keng, S., Ekblad, A., & Brantley, J. (2012). Effects of mindfulness-based stress reduction on emotional experience and expression: a randomized controlled trial. *Journal of Clinical Psychology, 68*(1), 117-131. doi:10.1002/jclp.20857

Rubia, K. (2009). The neurobiology of meditation and its clinical effectiveness in psychiatric disorders. *Biological Psychology, 82*(1), 1-11. Doi:dx.doi.org/10.1016/j.biopsycho.2009.04.003

Ryan, T. (2013). *A mindful nation: How a simple practice can help us reduce stress, improve performance, and recapture the american spirit*: Hay House.

Sanger, K. L., & Dorjee, D. (2015). Mindfulness training for adolescents: A neurodevelopmental perspective on investigating modifications in attention and emotion regulation using event-related brain potentials. *Cognitive, Affective, & Behavioral Neuroscience*, *15*(3), 696–711. https://doi.org/10.3758/s13415-015-0354-7

Schonert-Reichl, K., & Lawlor, M. (2010). The effects of a mindfulness-based education program on pre- and early adolescents' well-being and social and emotional competence. *Mindfulness, 1*(3), 137-151. doi: 10.1007/s12671-010-0011-8

Semple, R. J., Reid, E. F. G., & Miller, L. (2005). Treating anxiety with mindfulness: An open trial of mindfulness training for anxious children. *Journal of Cognitive Psychotherapy, 19*(4), 379-392. doi:10.1891/jcop.2005.19.4.379

Semple, R., Lee, J., Rosa, D., & Miller, L. (2010). A randomized trial of mindfulness-based cognitive therapy for children: Promoting mindful attention to enhance social- emotional resiliency in children. *Journal of Child and Family Studies, 19*(2), 218-229.doi:10.1007/s10826-009-9301-y

Silvers, J. A., McRae, K., Gabrieli, J. D., Gross, J. J., Remy, K. A., & Ochsner, K. N. (2012). Age-related differences in emotional reactivity, regulation, and rejection sensitivity in adolescence. *Emotion, 12*(6), 1235-1247. doi: 10.1037/a0028297

Somerville, L. H., Jones, R. M., & Casey, B. J. (2010). A time of change: behavioral and neural correlates of adolescent sensitivity to appetitive and aversive environmental cues. *Brain and Cognition, 72*(1), 124-133. doi: 10.1016/j.bandc.2009.07.003

Spear, L. P. (2000). The adolescent brain and age-related behavioral manifestations. *Neuroscience and Biobehavioral Reviews, 24*(4), 417-463.

Spielberger, C. D. (1983). *State-trait anxiety inventory manual*. Redwood City, CA: Mind Garden, Inc.

Stanley, E. A., Schaldach, J. M., Kiyonaga, A., & Jha, A. P. (2011). Mindfulness-based mind fitness training: A case study of a high-stress predeployment military cohort. *Cognitive and Behavioral Practice, 18*(4), 566-576. doi:dx.doi.org/10.1016/j.cbpra.2010.08.002

Steinberg, L. (2007). Risk taking in adolescence: New perspectives from brain and behavioral science. *Current Directions in Psychological Science, 16*(2), 55-59. doi: 10.1111/j.1467-8721.2007.00475.x

Tang, Y.-Y., Yang, L., Leve, L. D., & Harold, G. T. (2012). Improving executive function and its neurobiological mechanisms through a mindfulness-based intervention: Advances within the field of developmental neuroscience. *Child Development Perspectives, 6*(4), 361-366. doi: 10.1111/j.1750-8606.2012.00250.x

Vago, D.R., Silbersweig, A. D. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART): a framework for understanding the neurobiological mechanisms of mindfulness. *Frontiers in Human Neuroscience, 6*(296), 1-30. doi: 10.3389/fnhum.2012.00296

Wall, R. B. (2005). Tai Chi and mindfulness-based stress reduction in a Boston Public Middle School. *Journal of Pediatric Health Care, 19*(4), 230-237. doi: dx.doi.org/10.1016/j.pedhc.2005.02.006

Wilson, S. J., & Lipsey, M. W. (2007). School-based interventions for aggressive and disruptive behavior: Update of a meta-analysis. *American Journal of Preventive Medicine, 33*(2, Supplement), S130-S143. doi: dx.doi.org/10.1016/j.amepre.2007.04.011

Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: Evidence of brief mental training. *Consciousness and Cognition, 19*(2), 597-605.

Table 1

Sample Size for Each Questionnaire Subscale

		Experimental Group	Active Control Group	Passive Control Group
STAI	Trait anxiety	25	12	14
CERQ	Acceptance	29	16	14
	Catastrophizing	29	16	14
	Other blame	29	16	13
	Planning	29	16	13
	Positive refocusing	29	16	14
	Putting into perspective	29	16	13
	Reappraisal	29	15	14
	Rumination	29	16	12
	Self-blame	29	16	14
ACS	Attentional focusing	24	14	15
	Attentional shifting	23	14	15
COPE	Acceptance	29	16	16
	Active coping	29	16	16
	Behavioral disengagement	29	17	16
	Denial	29	17	16
	Humor	29	16	16
	Mental disengagement	29	17	16
	Planning	29	17	16
	Positive reinterpretation	29	16	16
	Religious coping	29	16	16
	Restraint	29	17	16
	Substance use	29	15	15
	Suppression of competing activities	29	17	16
	Use of emotional social support	29	16	15
	Use of instrumental social support	29	17	16
	Venting of emotions	29	17	16

Table 2

Descriptive Statistics of Pre- and Post-Training Questionnaire Subscales for the Experimental, Active Control, and Passive Control Groups

		Experimental Group		Active Control Group		Passive Control Group	
		Pre	Post	Pre	Post	Pre	Post
STAI	Trait anxiety	46.14 (8.44)	43.45 (8.23)	42.18 (6.69)	42.25 (6.63)	45.48 (8.66)	54.47 (9.81)
CERQ	Acceptance	9.52 (2.63)	10.41 (2.99)	10.38 (2.68)	8.56 (1.93)	9.43 (3.37)	10.98 (4.27)
	Catastrophizing	9.83 (3.02)	9.21 (2.69)	9.77 (2.67)	9.31 (2.63)	8.71 (3.20)	9.55 (2.33)
	Other blame	7.66 (2.74)	8.38 (2.66)	9.17 (2.25)	7.56 (3.01)	7.23 (3.20)	7.95 (3.66)
	Planning	11.69 (3.95)	11.82 (3.46)	11.50 (2.14)	9.98 (3.43)	10.51 (4.21)	11.46 (3.43)
	Positive refocusing	10.21 (3.38)	10.2 (4.07)	10.38 (2.53)	9.81 (2.79)	8.50 (2.85)	8.74 (3.48)
	Putting into perspective	10.59 (3.30)	11.48 (3.95)	11.23 (3.12)	9.31 (3.26)	9.00 (3.34)	12.00 (4.83)
	Reappraisal	11.00 (3.62)	11.31 (4.18)	10.36 (1.86)	10.19 (3.39)	9.67 (3.76)	11.00 (4.22)
	Rumination	11.48 (3.21)	11.63 (3.71)	11.25 (2.79)	10.67 (3.81)	10.58 (4.19)	11.31 (3.46)
	Self-blame	8.41 (2.82)	8.79 (2.55)	10.00 (3.16)	7.50 (2.16)	9.43 (3.46)	10.74 (4.70)
ACS	Attentional focusing	22.28 (3.19)	20.9 (3.16)	21.43 (3.55)	20.29 (1.94)	21.47 (4.34)	21.33 (3.18)
	Attentional shifting	25.78 (3.38)	26.67 (2.26)	25.57 (3.74)	26.43 (3.55)	28.37 (5.01)	27.60 (4.87)
COPE	Acceptance	10.34 (2.45)	9.94 (3.36)	11.71 (2.82)	9.69 (2.55)	9.94 (2.14)	10.81 (2.86)
	Active coping	10.10 (2.18)	10.03 (2.92)	11.06 (2.46)	9.81 (2.29)	10.23 (2.67)	9.06 (2.24)
	Behavioral disengagement	7.00 (2.38)	7.10 (2.27)	6.71 (2.02)	8.10 (3.03)	7.69 (3.30)	7.88 (1.89)
	Denial	7.00 (3.04)	7.41 (2.50)	6.65 (2.37)	8.06 (2.36)	7.58 (2.85)	7.25 (2.67)
	Humor	10.41 (3.59)	8.62 (3.29)	11.75 (3.30)	8.75 (3.71)	10.25 (3.15)	9.90 (3.55)
	Mental disengagement	9.62 (2.81)	9.00 (2.62)	10.41 (2.09)	10.18 (2.51)	10.69 (2.85)	10.04 (1.90)
	Planning	10.00 (3.14)	10.24 (3.21)	10.29 (3.06)	11.00 (2.69)	9.81 (3.04)	9.81 (2.93)
	Positive reinterpretation	11.55 (2.89)	11.55 (3.02)	11.19 (2.43)	10.85 (3.04)	10.60 (2.73)	11.13 (2.80)
	Religious coping	9.17 (3.64)	9.52 (3.77)	8.50 (4.18)	9.06 (4.06)	7.63 (2.53)	7.90 (3.61)
	Restraint	8.57 (2.28)	9.59 (2.77)	9.29 (2.52)	9.47 (2.07)	9.38 (2.39)	8.88 (3.28)
	Substance use	6.68 (3.36)	5.97 (2.87)	8.07 (4.10)	7.07 (3.86)	8.73 (4.51)	7.67 (3.35)
	Suppression of competing activities	9.32 (2.60)	8.69 (2.30)	9.35 (2.78)	9.65 (2.26)	9.13 (2.55)	8.81 (2.29)
	Use of emotional social support	8.17 (3.02)	9.21 (3.19)	8.63 (4.10)	9.42 (2.99)	8.38 (2.70)	8.62 (2.57)
	Use of instrumental social support	9.17 (2.85)	9.71 (2.59)	10.47 (2.79)	10.47 (2.61)	9.81 (2.97)	9.00 (3.39)
	Venting of emotions	8.84 (2.87)	9.22 (2.48)	8.76 (2.68)	9.10 (2.79)	10.19 (2.64)	9.19 (2.81)

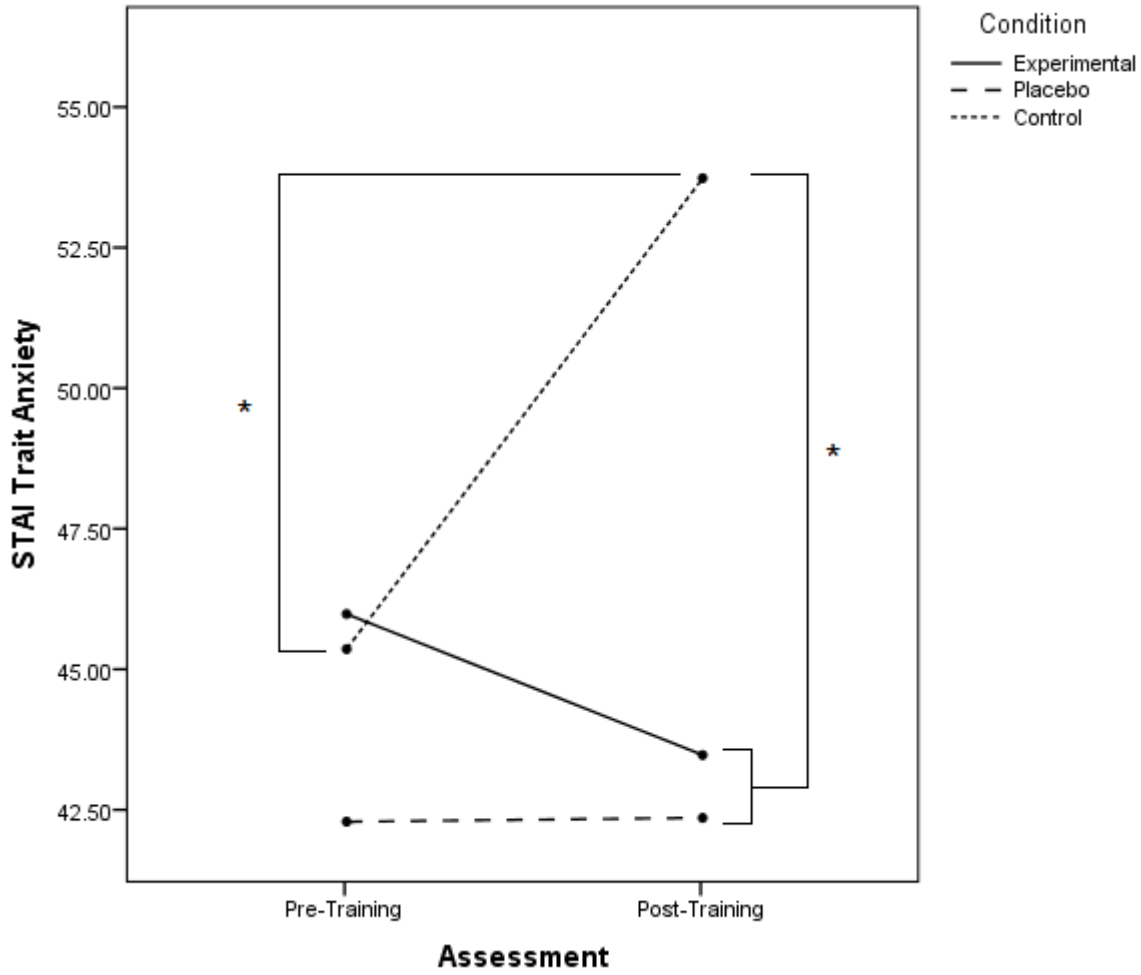

Figure 1. The passive control group showed increases in trait anxiety from pre- to post-training while the experimental and active control groups did not show any changes.

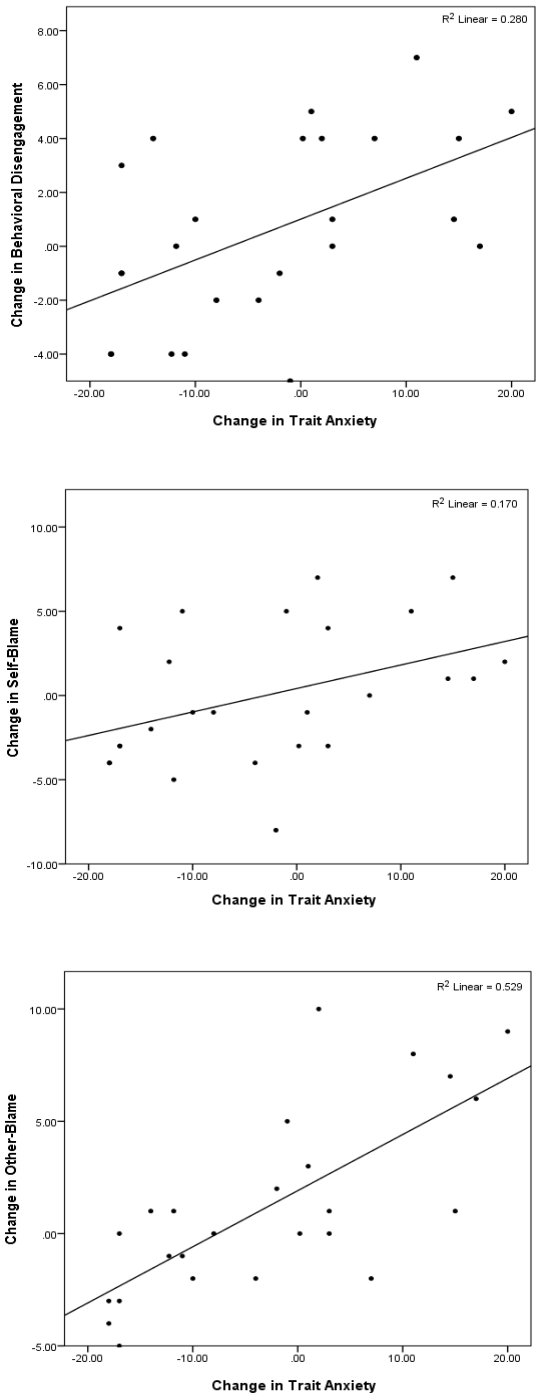

Figure 2. For adolescents who completed mindfulness training, decreases in trait anxiety were associated with decreases in behavioral disengagement, self-blame, and other-blame.

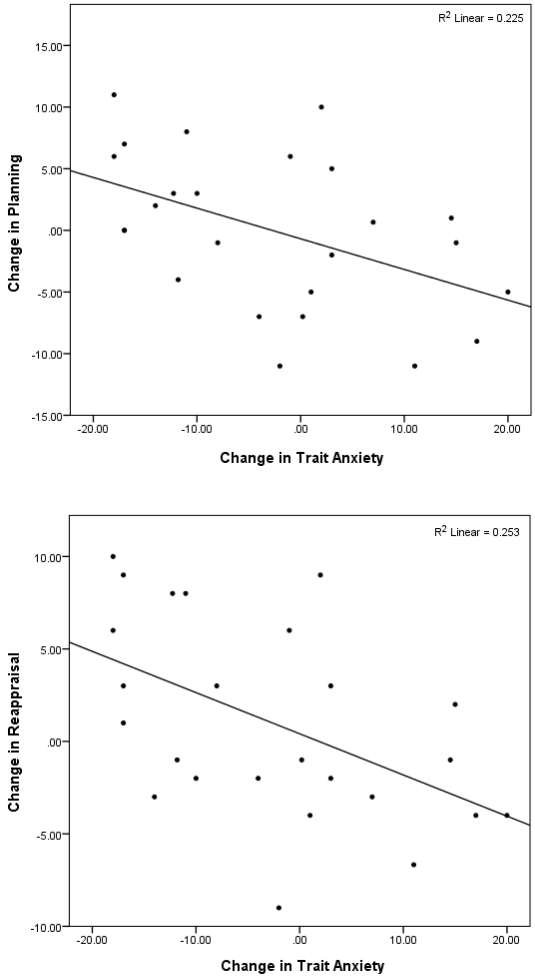

Figure 3. For adolescents who completed mindfulness training, decreases in trait anxiety were associated with increases in planning and reappraisal.