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Sarah Sass

The University of Texas at Tyler, ssass@uttyler.edu

Staci Zolkoski

szolkoski@uttyler.edu

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**School-based mindfulness program and anxiety prevention in eighth graders:
A randomized pilot study**

Sarah M. Sass¹

The University of Texas at Tyler

Staci Zolkoski

The University of Texas at Tyler

Adolescence is a period marked by challenges, and an adolescent's sensitivity to stress and anxiety can interfere with resilient coping. Educational leaders should consider mindfulness programs because they appear promising in preventing mental health issues in adolescents and are acceptable to youth from diverse backgrounds. The present randomized school-based pilot study addressed whether mindfulness was associated with preventing stress, anxiety, or depression, and whether resilience would increase in healthy eighth graders randomized to 8-sessions of a mindfulness program or a wait-list control group. Self-report measures of psychological functioning (e.g., stress, anxiety, depression, resilience) were completed before and after a mindfulness or wait-list control group. As expected, adolescent-reported anxiety did not increase from pre-to-post participation in the mindfulness group, but did in the control group, consistent with a prevention effect during a period that included standardized benchmark testing. Parent-reported adolescent emotional problems decreased from pre-to-post in the mindfulness and not control group, demonstrating an intervention effect. These findings add to the school-based mindfulness literature and suggest that engaging in mindfulness practices may provide support to adolescents during a critical period of change and growth. Implications for future mindfulness research with adolescents are discussed.

KEYWORDS: adolescents; anxiety; school-based mindfulness; resilience

Introduction

Adolescence is a period marked by new social and emotional challenges as well as considerable hormonal and brain changes (Eiland & Romero, 2013). It is likely that stress is involved in the onset of psychological disorders (e.g., Anderson & Teicher, 2008), and many mental health issues begin during the adolescent period (Kessler et al., 2005; 2007). Physiological changes that begin with puberty contribute to an adolescent's sensitivity to stress (Fuhrmann, Knoll, & Blakemore, 2015; McEwen & Morrison, 2013), and brain regions associated with executive functioning and emotion regulation can be adversely impacted by stress during adolescence (e.g., Eiland & Romeo, 2013; McEwen & Morrison, 2013). Since these

¹ Authors are listed alphabetically, and provided equal contribution to this project.

brain regions facilitate both effective academic functioning and optimal mental health, providing adolescents with tools to regulate stress appears crucial in helping prevent or ease the burden of emerging mental health issues as well as promoting resilience (e.g., Davidson et al., 2012; Zolkoski & Bullock, 2012).

Mindfulness practices have spread from western application in medicine to education and have shown promise in preventing mental health and resilience issues in adolescents (e.g., Felver et al., 2019; Meiklejohn et al., 2012; Zenner, Hermleben-Kurz, & Walach, 2014). Educational leaders are looking at alternative practices such as mindfulness as a preventative proactive approach for improving student and teacher well-being (e.g., Armstrong, 2019; Burrows, 2011). Despite the promise of mindfulness interventions for adolescents, most of the literature in youth has employed uncontrolled studies (Dunning et al., 2019; Johnson, Burke, Brinkman, & Wade, 2016), with less than a third of studies including randomized assignment to a mindfulness or control group (Dunning et al., 2019). In addition, many mindfulness interventions are not conducted within the school setting (Shapiro et al., 2015; Zenner et al., 2014). Both issues are addressed in the present study. The primary goal of the present study was to assess whether mindfulness training is beneficial to preventing mental health issues and promoting resilience in adolescents while using an established mindfulness curriculum in a randomized controlled design. We hypothesized that mindfulness training would be associated with steady levels of adolescent-reported stress, anxiety, or depression in the mindfulness group, and increases in symptoms in the control group, consistent with a prevention effect. We also hypothesized that adolescent-reported resilience would increase in the mindfulness and not control group. In order to assess the parent perspective, we invited parents to report on emotional problems (e.g., anxiety and depression symptoms), and we hypothesized that mindfulness training would be associated with steady levels of emotional problems while the control group would show an increase.

Method

Participants

The authors made initial contact with the principal and assistant principal of a local charter school in order to gain permission for the use of an advisory period in two eighth grade classrooms as an acceptable time to offer the mindfulness or wait-list control conditions. Prior to engaging in any procedures, the study was approved by the University of Texas at Tyler Institutional Review Board. Recruitment procedures involved offering informational sessions for parents and a short presentation to eighth graders in the charter school where the study took place. All eighth graders (13 – 14 years old) from the 2 available classrooms were recruited at the charter school, and consent and assent forms were distributed at an informational session with parents, as well as sent home with students and/or emailed to parents. Of the 36 available eighth graders, 20 (10 males, 9 females, 1 transgender) provided consent to participate in the study. Of these, 14 identified as White/Caucasian, 5 identified as multiracial, and 1 identified as American Indian or Alaska Native. Of those who consented to participate, stratified random sampling was used to assign participants from each of the two eighth grade classrooms to the mindfulness ($n = 11$) or control ($n = 9$) group. The eight mindfulness sessions spanned eleven weeks (with 3 missed weeks due to school events or spring break). Groups began in late January and continued through the first week of April. A second round of optional mindfulness training

was offered to those wait-list control group participants who wished to have it, and data were not collected from these groups.

Pre- and Post-Measures

Adolescents completed the Depression and Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995; Szabo, 2010), containing three subscales: depression (“I couldn’t seem to experience any positive feeling at all”), anxiety (“I felt scared without any good reason”), and stress (“I felt that I was rather touchy”). Statements were rated on a 4-point Likert scale from 0 (not at all) to 3 (very much, or most of the time) over the past week. The DASS-21 is reliable and valid in non-clinical adolescents with high convergent and discriminant validity (e.g., Johnstone et al., 2016) and good Cronbach’s alpha (e.g., Raes, Griffith, Van der Gucht, & Williams, 2014).

Adolescents and parents completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The SDQ is a 25-item measure with a 3-point Likert scale from 0 (not true) to 3 (certainly true) and includes the following subscales: emotional problems (EP; “I worry a lot”), conduct problems (CP; “I get very angry and often lose my temper”), hyperactivity-inattention (Hyp; “I am easily distracted, I find it difficult to concentrate”), peer relationship problems (PP; “I would rather be alone than with people of my age”), and prosocial behavior (PB; “I try to be nice to other people. I care about their feelings”). Cronbach’s alpha ranges from good to excellent across self, teacher, and parent ratings and has been found to be appropriate across adolescent, parent, and teacher ratings (e.g., Bourdon, Goodman, Rae, Simpson, & Koretz, 2005; Deighton et al., 2014).

The Resilience Scale (RS; Wagnild & Young, 1993) was used to measure self-reported resilience and is a 25-item measure targeting five core characteristics: purpose, perseverance, self-reliance, equanimity, and authenticity. Questions are positively worded (“I can get through difficult times because I’ve experienced difficulty before”) with a typically good to excellent Cronbach’s alpha (Wagnild, 2009).

Mindfulness Program

The Still Quiet Place (SQP; Saltzman, 2014) program includes eight sessions and is adapted for children and adolescents from the well-researched Mindfulness Based Stress Reduction program (MBSR; Kabat-Zinn, 1990) for adults. Study authors completed a 10-week SQP training offered by Amy Saltzman one year prior to working with participants in the study. Both researchers engaged in regular mindfulness practice prior to and throughout implementing mindfulness with student participants. Additionally, Dr. Sass has approximately 20 years of mindfulness experience, and Dr. Zolkoski has extensive experience working with students and teachers in the K-12 environment. Each group session was facilitated by Drs. Sass and Zolkoski was approximately 45 minutes.

In line with other randomized pilot studies (e.g., Felver et al., 2019), the total adolescent sample size was 20 (11 Mindfulness, 9 Control). Adolescents missed different numbers of items on paper and pencil pre- and post-questionnaire measures, and only complete data were

analyzed². Fifteen parents (8 Mindfulness, 7 Control) provided complete pre- and thirteen parents (7 mindfulness and 6 control) provided complete post-SDQ data. Parents provided data online via Qualtrics (SAP SE, Walldorf, Germany).

Baseline internalizing symptoms were not elevated, and baseline resilience was high (see Table 1). Hypotheses tested whether mindfulness would be associated with no change in student and parent-reported measures in the mindfulness and not control group on symptom measures, consistent with a prevention effect, and whether resilience would increase in the mindfulness and not control group. Separate 2 (Group: Mindfulness, Control) x 2 (Time: Pre, Post) repeated-measures ANOVAs were run for each outcome measure separately to test hypotheses.

Results

Baseline scores

There were no baseline differences between groups on any of the outcome measures (see Table 1).

Adolescent Questionnaire Data

In the absence of omnibus effects (see Table 2), based on the a priori hypothesis that psychological distress would increase in the control and not mindfulness group, simple effects Time ANOVAs were run for each group separately for these measures. As expected from a prevention framework, DASS-Anxiety did not increase in the mindfulness, $F(1, 10) = 0.16, p = .702$, partial $\eta^2 = .015$, but increased in the control group, $F(1, 7) = 5.65, p = .049$, partial $\eta^2 = .446$ (see Figure 1, top panel).

Parent Questionnaire Data

In the absence of omnibus effects (see Table 2), based on the a priori hypothesis that parent-reported internalizing symptoms (SDQ-Emotional Problems) would increase in the control and not mindfulness group, simple effects Time ANOVAs were run for the mindfulness and control group separately for this subscale. Parent-reported emotional problems decreased in the mindfulness, $F(1, 6) = 8.82, p = .025$, partial $\eta^2 = .595$, and not control group, $F(1, 5) = 0.53, p = .501$, partial $\eta^2 = .095$ (see Figure 1, bottom panel).

Available numbers of participants who had both pre- and post- data for each subscale are as follows: 11 Mindfulness and 8 Control for DASS-Anx and SDQ-EP, 10 Mindfulness and 9 Control for DASS-Stress, 10 Mindfulness and 8 Control for DASS-Dep, and 10 Mindfulness and 7 Control for the RS. Fifteen parents completed the pre-SDQ (8 Mindfulness, 7 Control) but only thirteen parents (7 mindfulness and 6 control) completed post-SDQ.

Table 1*Descriptive Statistics for Pre- and Post- Measures and Lack of Baseline Differences*

	Mindfulness		Control		Baseline
	Pre M (sd)	Post M (sd)	Pre M (sd)	Post M (sd)	Group <i>F</i> (<i>p</i>)
Dep	6.8 (5.2)	5.5 (4.4)	6.9 (4.6)	6.4 (5.4)	.00 (.97)
Anx	5.7 (4.8)	6.3 (3.5)	5.4 (3.0)	7.3 (3.6)	.02 (.88)
Str	6.7 (4.4)	5.6 (3.9)	8.1 (4.3)	6.9 (4.1)	.50 (.49)
EP	3.9 (2.6)	3.7 (2.6)	4.1 (1.6)	4.3 (2.5)	.04 (.84)
CP	2.4 (1.8)	2.4 (2.2)	2.0 (1.5)	2.0 (1.5)	.23 (.64)
PP	2.9 (1.8)	3.1 (2.1)	2.8 (1.6)	2.6 (0.8)	.28 (.87)
Hyp	5.4 (1.9)	5.3 (2.3)	5.2 (1.9)	4.7 (1.9)	.29 (.87)
PB	7.0 (1.5)	6.5 (2.2)	6.4 (1.8)	6.4 (3.5)	.57 (.46)
RS	119 (20.4)	125 (16.5)	120 (24.8)	123 (33.6)	.01 (.92)
SWLS	17 (6.8)	16 (6.5)	18 (6.1)	17.2 (7.6)	.00 (.97)
EP-P	3.6 (2.7)	2.4 (1.8)	2.7 (2.2)	2.4 (1.0)	.50 (.49)
CP-P	0.9 (0.8)	0.9 (0.6)	1.9 (2.4)	1.4 (1.4)	1.2 (.30)
PP-P	3.0 (1.1)	2.6 (1.4)	2.4 (1.3)	2.4 (1.9)	.90 (.36)
Hyp-P	5.0 (2.4)	4.4 (2.5)	3.7 (3.4)	3.7 (2.7)	.75 (.40)
PB-P	8.4 (1.6)	8.5 (1.2)	7.4 (2.6)	7.6 (2.5)	.76 (.40)

Note. Dep, Anx, and Str are the subscales of the DASS-21; EP, CP, PP, Hyp, and PB are the subscales of the SDQ (-P indicates parent data); RS is the Resilience Scale, and SWLS is the Satisfaction with Life Scale. *F* and *p* values correspond to baseline univariate ANOVAs comparing baseline outcome measures between the mindfulness and control group on each questionnaire measure. Baseline means are based on all available pre data.

Table 2

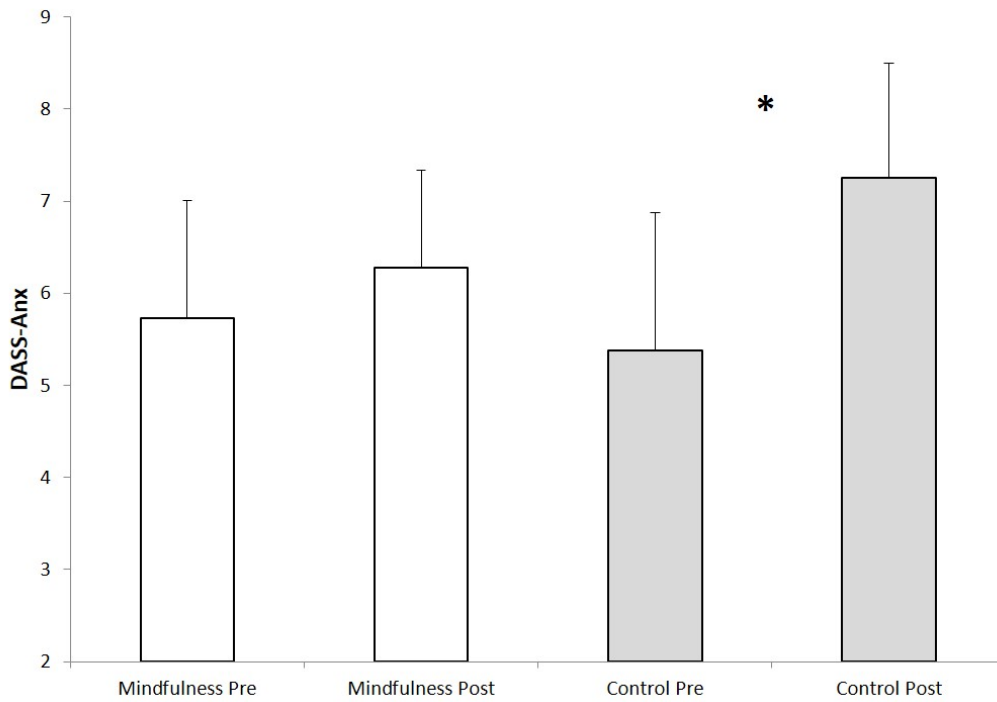
Omnibus Repeated-Measures ANOVA Effects for All Measures

	Group			Time			Group x Time		
	<i>F</i>	<i>p</i>	partial η^2	<i>F</i>	<i>p</i>	partial η^2	<i>F</i>	<i>p</i>	partial η^2
Dep	0.01	0.94	<.001	0.27	0.61	.017	0.09	0.77	.005
Anx	0.04	0.85	.002	1.88	0.19	.099	0.46	0.46	.032
Str	0.76	0.40	.043	1.70	0.21	.091	0.13	0.73	.007
EP	0.16	0.70	.009	0.08	0.78	.005	0.08	0.78	.005
CP	0.21	0.65	.013	0.26	0.62	.016	< 0.01	0.96	<.001
PP	0.85	0.77	.005	0.08	0.79	.005	0.46	0.51	.028
Hyp	0.24	0.63	.013	0.46	0.51	.025	0.24	0.63	.013
PB	0.17	0.69	.010	0.24	0.63	.014	0.24	0.63	.014
RS	0.22	0.65	.014	0.01	0.98	<.001	0.88	0.36	.055
SWLS	0.05	0.83	.003	0.57	0.46	.031	0.21	0.65	.012
EP-P	0.02	0.88	<.002	4.45	.059	.228	0.59	0.46	.051
CP-P	1.56	0.24	.124	1.19	0.30	.097	1.19	0.30	.097
PP-P	0.15	0.71	.013	0.24	0.64	.021	0.24	0.64	.021
Hyp-P	0.21	0.66	.018	3.34	0.10	.233	0.48	0.28	.105
PB-P	1.34	0.27	.109	0.66	0.44	.056	0.01	0.95	<.001

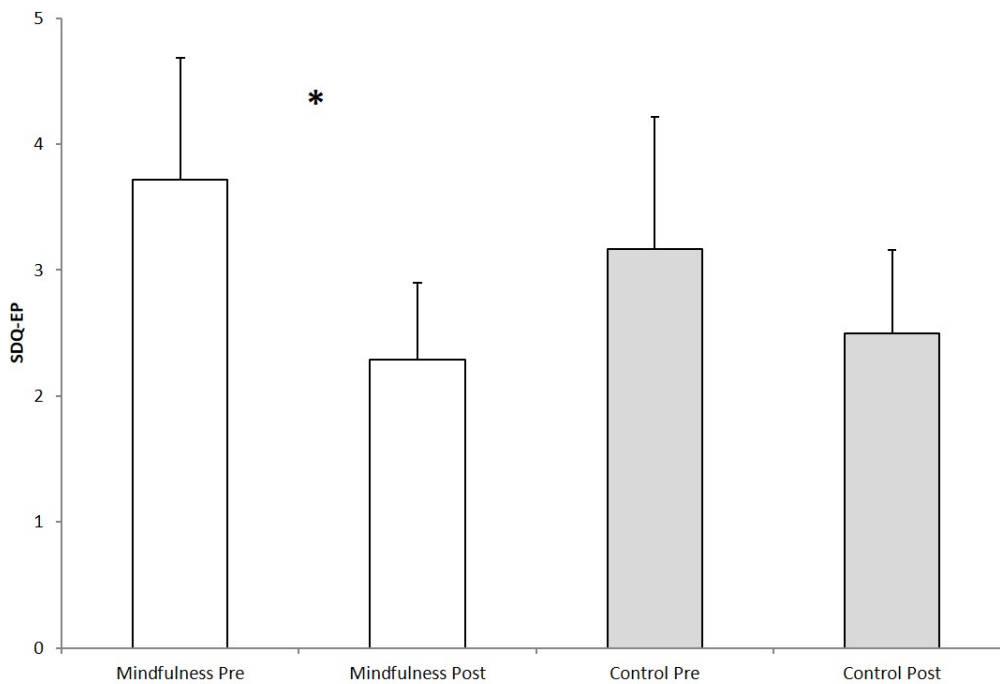
Note. Dep, Anx, and Str are the subscales of the DASS-21; EP, CP, PP, Hyp, and PB are the subscales of the SDQ (-P indicates parent data); RS is the Resilience Scale, and SWLS is the Satisfaction with Life Scale. *F*, *p*, and partial η^2 values are reported for the omnibus repeated-measures ANOVAs for the Group, Time, and Group x Time effects for each questionnaire measure.

Figure 1

Adolescent- and parent-reported changes.



Note. Error bars represent 1 SE. Top: Adolescent-reported DASS-Anx scores increased from pre-to-post in the control and not mindfulness group.



Note. Bottom: Parent-reported SDQ-EP scores decreased from pre-to-post in the mindfulness and not control group.

Discussion

The present pilot study builds on the previous literature by including stratified random assignment in a school-based design and focusing on healthy, unselected eighth graders during adolescence, a period marked by new challenges and risk of developing emotional problems. To our knowledge, the present study is the first to employ the Still Quiet Place intervention using a randomized controlled design (Semple, Drouman, & Reid, 2017). Adolescent-reported anxiety did not increase in the mindfulness group but did in the control group, consistent with a prevention effect (Pössel et al., 2008). This result occurred in the context of state-mandated standardized practice testing and suggests mindfulness strategies may be helpful in managing normative levels of anxiety in the context of such testing, which can increase stress and anxiety levels in students (Abeles, 2015). Consistent with an intervention and not prevention effect, parent-reported adolescent emotional problems (e.g., items included “complaining of headaches,” “often tearful”) decreased in the mindfulness and not control group. This pattern is consistent with common discrepancies between parents and adolescents in internalizing symptom reporting, (e.g., De Los Reyes et al., 2015) and may suggest that parents observed a change in behavior that adolescents did not internally experience as meaningful.

A mindfulness prevention effect was not evident for adolescent-reported stress, depression, or emotional problems, or an increase in resilience. Because the present study was limited by a small sample size, tentative conclusions from the present study should be drawn. Other limitations included missing responses in adolescent data and the voluntary nature of participation in the study, which may have biased participation toward those who were more open to mindfulness specifically or research in general.

The present pilot study had several strengths, including using stratified random assignment, conducting mindfulness within a school setting which can reduce barriers to participation, the inclusion of multiple informants (student, parent) which can be informative of changes meaningful to parents (e.g., De Los Reyes et al., 2015), and in piloting an established mindfulness curriculum that has not yet been tested in adolescents using a stratified randomization design. In addition, to our knowledge this is the first adolescent mindfulness-based study conducted in the East Texas area, and approximately 56% volunteered to participate, even though doing so came at the cost of using their advisory period for other activities such as catching up on homework, talking with peers, playing video games, or participating in other potentially more immediately rewarding activities. The present mindfulness curriculum thus appears to be a good candidate for use in future school-based prevention studies that target larger sample sizes.

Present findings add to the literature by suggesting mindfulness can have an anxiety prevention effect in healthy adolescents during a critical period of change and growth and being the first (to our knowledge) to include the Still Quiet Place program in a randomized pilot trial with eighth graders. Future studies should build on present findings by increasing sample size and using randomized controlled designs (efficacy research) alongside measures that assess whether mindfulness practices are well received (effectiveness research). Mindfulness curriculums can be used as a universal prevention method designed to support mental well-being in youth. Educational leaders should consider implementing mindfulness practices within the school setting as a preventative proactive practice. Although practicing mindfulness takes time and consistency, it is a low-cost strategy that educational leaders can encourage their teachers to practice with students. Furthermore, it is important to note that mindfulness interventions appear

to be well-accepted by adolescents from various cultural backgrounds within the United States, including with Asian American (Fung, Guo, Jin, Bear, & Lao, 2016), Latinx (Edwards, Adams, Waldo, Hadfield, & Biegel, 2014), African American (Sibinga et al., 2013), and Native American youth (Le & Gobert, 2015), making these interventions useful in a range of cultural contexts.

Mindfulness practices can occur during any time of the day (e.g., at the start of the day, during “brain breaks,” and at transition times) to help prevent or reduce risk factors in youth. Educational leaders want to provide students with the tools they need to be successful beyond the school setting. Practicing mindfulness can help adolescents manage their emotions which can improve academic and social skills beyond the classroom; in turn creating lasting positive effects.

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