



Original Article

Mindfulness based intervention with an attentional comparison group in at risk young adolescents: a pilot randomized controlled trial

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ABSTRACT

Background: Risky behaviors are related to poor outcomes among young adolescents. This study piloted a mindfulness based intervention, Learning 2 Breath Mindfulness Curriculum, focusing on the feasibility of programming and intervention effects on coping, affect, and trait mindfulness among at-risk adolescents. Further, the mindfulness based intervention was compared to an attention intervention.

Methods: Sixth-grade level female students in a boarding school for at-risk youth randomly allocated to either the mindfulness intervention ($n = 12$) or an attention intervention ($n = 11$) for six weeks. Outcomes (i.e., primary coping, positive affect, and trait mindfulness) were assessed before and after the interventions.

Results: Intervention groups did not differ in demographics or outcomes at baseline. Twenty-two of 23 (95.7%) registered participants attended all of the sessions. Participants completed 86.4% of study tools. Separate repeated measures ANOVAs revealed no significant interactions among group and time for primary coping, positive affect, or mindfulness. However, positive affect did increase [$F(1, 17) = 10.675$, $p = 0.005$, partial $\eta^2 = 0.39$] over time for both groups and there was a slight increase in trait mindfulness over time (although not statistically significant; $p = 0.095$, partial $\eta^2 = 0.155$). Primary coping did not change with time.

Conclusion: The mindfulness intervention utilized in the present study exhibited feasibility in this population. Although preliminary, mindfulness based interventions may contribute to positive affect among at-risk youth in a boarding school. Limitations and future directions are discussed.

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1. Introduction

Risk factors for poor outcomes in adolescence include poverty, being raised by a single parent, being born to a teenage mother, living in a ‘foster’ household, parental alcoholism and being abused mentally or physically.^{1,2} These risk factors are paired with lower academic achievement, incarceration, teen pregnancy, increased mental illness and violence after controlling for sex, race/ethnicity and education.³ The risk for social-emotional difficulties and diminished academic performance manifest as behavioral problems and are increased by stressors in youth.⁴ Long-term psychosocial stress from the breakdown of the family unit, media violence, and poverty result in negative behavior and

decreased social skills in youth.^{5,6} Adverse outcomes from stressful life events make it necessary to find and implement effective, affordable, strategies to decrease stress in teenagers.^{5,7} Reducing stress may be a way to improve psychological well-being, prevent poor mental health outcomes, and onset of substance use.

Increasing evidence supports adolescence as a vital time to introduce stress reduction techniques with the goals of risk reduction and improving mental health.^{6,8–10} During adolescence, children gain a sense of accomplishment and strengthen self-esteem. Confidence and task engagement in the age group are influenced by neuroplasticity that heightens the child’s skillful reflection on their successes and failures, expansion of their social realm beyond immediate family and exposure to competition and social comparison with others. Cognitive thinking and understanding abstract concepts are improved and consolidated.¹¹ Mindfulness teaching is a potentially powerful tool for adolescents because it may improve coping and reduce stress.

Mindfulness-Based Stress Reduction (MBSR), formulated by Jon Kabat-Zinn^{12,13} teaches clients an ancient and transforming

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practice as an adjunct to their medical treatments. MBSR programs are successful in decreasing stress and increasing coping in adults and can be modified for youth.¹⁴ These modifications may include decreased meditation time, mindful eating practice at each session and shortening the course duration from 8 to 6 weeks.¹⁵ Youth participating in mindfulness programs demonstrate improvements in self-regulation,¹⁶ attention, emotional and social functioning^{17,18} and overall well-being.^{18,19} Further, a meta-analysis of the effectiveness of mindfulness in adolescents reported mindfulness interventions as a useful addition to helping adolescents improve mental health symptoms and quality of life.²⁰ There is a growing body of research examining mindfulness-based interventions among at-risk youth. In one study, Sibinga and colleagues²¹ found that at-risk, urban dwelling middle school students participating in mindfulness-based programs show significantly lower somatization, negative affect and coping, depression, self-hostility, rumination and post-traumatic stress disorder as compared to their peers receiving only health education.²¹

Mindfulness related theories pose that with focused meditation comes mindfulness and calmness. Through proper practice the self can minimize negative emotions, actions and thoughts. Mindfulness practice is predicted to be successful in the at-risk adolescent population for this study for the potential to foster wholesome thoughts, compassionate behaviors toward others and self along with joy and loving-kindness.¹⁹

To provide further support for the efficacy of mindfulness interventions among at-risk youth, the present study evaluated a mindfulness intervention (MC) in a public boarding school setting, focusing on feasibility of programming with a subset of the most vulnerable, high-risk adolescents. The primary aim of the study was to establish 'proof of concept' that a mindfulness intervention (MC) is feasible in a vulnerable group that is underrepresented in research. The target population and focus of the intervention was approximately 30 of the 40 sixth grade girls residing at the school. Middle school girls from low socio-economic backgrounds are more susceptible to stressors adversely affecting mental health and revictimization from initial traumatic events.²² To determine the efficacy of the six-week mindfulness program, intervention effects were evaluated on coping, positive affect, and trait mindfulness outcomes and compared to a six-week attentional program. We expected that girls in the mindfulness group would show increased primary coping, positive affect and mindfulness.

2. Method

2.1. Participants

Participants were female 6th grade students who attend a boarding school for at-risk youth living throughout Maryland with a high-quality academic program and a nurturing boarding program. Eligibility for the school is meeting at least one of the following criteria: a household income at 100% or below poverty level, a primary caregiver that is not a biological parent, a single parent household, a history of being abused and/or a history of being expelled from a previous school. The girls live in campus dormitories Monday through Friday during the school year. Students were eligible for inclusion in the present study if they were 11–13 years old and their responsible parent/caregiver at least 18 years old at time of enrollment. Students were not eligible to participate if the parent/caregiver was not fluent in English, or the student was unable to complete the measurement tools, unable to attend intervention meetings due to school or personal conflicts, currently pregnant, or failing 2 or more subjects in school.

Students who met the inclusion criteria were recruited by the investigator via word of mouth and by providing an information

table between classes and during special school events such as a student art show, parent/teachers conferences and dorm social events. The researcher provided an information flyer with written information for students and caregivers. The academic leadership team, faculty and staff were made aware of the research opportunity through email and individual faculty meetings. If interested, the purpose and details of the study were discussed with students and their parents before enrollment in the study. IRB approved consent forms were signed by at least one parent or guardian and approved assent forms contained the signature of each participant before the beginning of the study. There was no compensation for participation in the study.

2.2. Procedure

Participants were allocated to one of two intervention groups via block randomization by residence floor: Mindfulness Curriculum (MC) or Attentional Comparison (AC). The MC group participated in a structured mindfulness-based intervention (see Appendix A for implementation details). The AC group consisted of structured discussion in a seminar-like setting of their experiences in middle school and as adolescents (see Appendix B for implementation details). Both intervention groups met for 1–1.5 hours weekly, in the evening after dinner, for six weeks in conference rooms on the school campus.

2.2.1. Mindfulness curriculum group

The weekly MC sessions were led by a board-certified family nurse practitioner trained in Mindfulness techniques (i.e., MBSR) and the L2B mindfulness curriculum.¹⁵ The MC intervention included meeting with the adolescents as a group to guide girls in physical awareness, serious thought and consideration of self, emotional awareness and regulation, fostering attention, practicing tenderness and awareness of habits. The MC included specific mindfulness interventions around mindful eating, listening and movement as well as small group interactions to talk about feelings and emotions, both pleasant and unpleasant events.¹⁵ Previous implementation of the Learning to BREATHE Program¹⁵ among 216 public high school students found decreased levels of perceived stress and psychosomatic complaints along with increased levels of affective regulation.²³

2.2.2. Attentional comparison group

The weekly AC sessions were led by a board-certified Psychiatric Mental Health Nurse Practitioner. The AC intervention was written by the research team to mirror but not overlap the mindfulness intervention. The AC included meeting in a group setting to guide students in assertiveness training, proper nutrition, discuss/practice goal setting, possible barriers to implementing goals and how to stick with long-term goals. The attention only group was based on known standards, specific to adolescents.

2.2.3. Treatment fidelity

Treatment integrity was maintained throughout the study. Internal validity was prioritized by meeting in separate, mirror image conference rooms for intervention sessions. Participants were instructed to not discuss the content of the interventions with peers. Uniform administration of the interventions was implemented as there was one provider for each intervention throughout the study. The two providers met before and after the overall 6-week study in addition to before and after weekly sessions to ensure the interventions were being run in a uniform, consistent manner. External validity was strengthened by using a standard mindfulness curriculum for adolescents that is statistically valid, reliable and shown to be generalizable to adolescents in existing literature.¹⁵

A third trained interventionist well versed in mindfulness training and psychiatric health reviewed and approved scripts for each session of both intervention groups.

2.3. Outcome measures

Baseline demographic data and history were obtained from the student and parent or guardian prior to the beginning of the intervention. All students participating in the study completed self-reported assessment tools before the first session. The following instruments were completed before the interventions (baseline) and after the interventions (6 weeks).

2.3.1. Response to Stress Questionnaire

The 57-item Response to Stress Questionnaire (RSQ) instrument²⁴ was used to evaluate voluntary and involuntary reactions to stressors and was formulated according to varied responses specific to children and adolescents. The measure uses a 4-point Likert response scale (1 = *No stress or problem coping* to 4 = *A lot of stress or problem coping*). Higher scores represent increased use of coping mechanisms. It is recommended that the total score for primary coping be calculated and divided by the total RSQ score to control for response bias and individual differences in base-rates of item endorsement.²⁴ The current study focused on nine items related to primary engagement coping with possible scores ranging from 0.15–0.63 after being divided by 57, the total number of items in the tool.

2.3.2. Positive and Negative Affect Scale for Children

The 10-item Positive and Negative Affect Scale for Children (PANAS-C) was used to measure positive affect (PA). The shortened tool was adapted from the 20-item PANAS-C.²⁵ The 10-item PANAS-C provides information regarding affect and can be used in the school or clinic setting.²⁵ The PA questions ($M = 16.9$, $SD = 5.5$) focus on joyful, cheerful, happy, lively and proud. The measure uses a 5-point Likert response scale (1 = *Very Slightly or Not at All* to 5 = *Extremely*) and the range for each scale is 5–25.²⁷ The newly formulated 10-item tool shows good reliability and validity with higher scores representing higher levels of positive affect.²⁵

2.3.3. Mindful Attention Awareness Scale

The Mindful Attention Awareness Scale (MAAS)²⁶ was used to measure mindfulness. It places a focus on present time attention and awareness, leaving out dimensions of mindfulness, such as non-judgmental accepting. Statements characterize ideas or actions that are not congruent with mindfulness such as being on automatic pilot, preoccupation and being distracted. The 15-item measure uses a 6-point Likert response scale (1 = *Almost Always* to 6 = *Almost Never*) and higher scores indicate higher levels of mindfulness with a possible range of 15–90. Specifically, MAAS demonstrated excellent reliability ($-.82$ – $-.87$) and was validated with multiple studies that demonstrate validity as the correlation between the MAAS and an alternate scale was .70.²⁶

2.4. Sample size calculation

To determine if our sample size provided adequate statistical power to detect significant effects a power analysis was conducted. Sample size was estimated as 11 per intervention group based on a large effect size, correlation of .80 among repeated measures, power of .80 and alpha .05.²⁸ The large effect size was chosen

Table 1
Demographics Characteristics of Participants

	Mindfulness (n = 12)	Attention control (n = 10)	p
Age [mean (SD)]	11.58 (0.72)	11.70 (0.68)	0.66
Race [N (%)]			0.65*
Black/African American	8 (66.7)	8 (80.0)	
Other/not provided	4 (33.3)	2 (20.0)	
Location [N (%)]			0.68*
Baltimore	7 (58.3)	7 (70)	
Outside Baltimore	5 (41.7)	3 (30)	
Outcomes [mean (SD)]			
Primary coping	0.17 (0.04)	0.17 (0.03)	0.81
Positive affect	18.50 (6.05)	14.70 (6.84)	0.18
Mindfulness	45.25 (12.51)	44.30 (7.10)	0.83

* Fischer's Exact Test.

due to a lack of previous data at the time of the study providing an *a priori* estimate of effect size. One of the purposes of the present study is to establish an effect size for larger studies in the future.

2.5. Data analysis

Before analyses were conducted, exploratory data analysis was performed. Data were cleaned and statistical assumptions were tested. The data were checked for normality and missingness. Corrective actions were not needed for the analysis. To confirm there was not a significant difference between intervention and control groups, t-test and fisher's exact analysis were used to compare groups prior to onset of the study.

To compare changes in primary coping, positive affect and trait mindfulness from before to completion of the intervention in the MC and AC groups, analysis of variance (ANOVA) with repeated measures (RM) was conducted in SPSS version 20. Specifically, the RMANOVA modeled time (pre-post) as the within subjects factor and intervention group as the between subjects factor (group \times time effects were also assessed). The results of the ANOVA were confirmed with linear mixed models (LMMs) with random intercepts; effect sizes were calculated from these analyses. Statistical significance was determined at $p < 0.05$. Finally, frequency analysis was used to describe participation in study activities (i.e., a marker of feasibility).

3. Results

3.1. Demographic data

In total, 23 6th grade girls assented and had parent or guardian consent to participate in the study (Table 1). There were no significant differences between the groups at baseline. Age of participants ranged from 11 to 13 years old ($M = 11$, $SD = 0.696$). Remaining participants ($n = 22$) were block randomized into two groups by separating the girls residing in the two 6th grade dormitory floors into to either an attentional intervention ($n = 10$) or a mindfulness intervention ($n = 12$). Grouping students by dorm floor was chosen to avoid discussion of specific intervention techniques between the separate intervention groups. There was one group run for each condition: attentional intervention or mindfulness intervention for a total of two groups.

Table 2
Changes of Outcomes After Intervention in the Mindfulness and Attention Control Groups ($n = 22$)

Outcomes	Mindfulness		Attention control	
	Pre ($n = 12$)	Post 6 weeks ($n = 10$)	Pre ($n = 11$)	Post 6 weeks ($n = 8$)
Primary coping	0.17 (0.04)	0.20 (0.06)	0.17 (0.03)	0.19 (0.02)
Positive affect	18.50 (6.05)	21.82 (04.19)	14.70 (6.84)	23.38 (2.26)*
Mindfulness	45.25 (12.51)	54.45 (14.77)	44.30 (7.10)	48.50 (16.06)

Values are expressed as mean (SD).

* $p < 0.05$ paired t -test between pre- and post-intervention.

There were no significant differences between two groups.

3.2. Feasibility

Feasibility was assessed by attendance at sessions and completion of required assessments. Criteria for successful completion of the program were attendance for at least half of a session for four out of six classes offered and successful completion of greater than 75% of measurement tools. One youth dropped out before the first class due to perceived social stigma associated with attendance and participation. Two students missed one session due to a reward trip sponsored by the school for being on honor role for the quarter and one student missed a session for an after-school sport in which she was a participant. Another student missed a session due to illness. All remaining participants $N = 19$ (86%) attended at least four intervention classes. Eight participants (36%) attended five classes and nine of the 22 participants (41%) attended all six sessions of the interventions provided. There were no significant differences between the two intervention groups in numbers of sessions attended and missed sessions were equally distributed across intervention groups. Feasibility was demonstrated by 95.7% of students meeting the criteria for successful completion. Another criterion for feasibility was the successful completion of >75% of the RSQ, 10-item PANAS-C and MAAS measures by the participating adolescents. There was 86.4% completion of study measures thus the goal of 75% or greater was met. Averages of existing data were used to replace missing values as data missing was completely at random.

3.3. Intervention effects

3.3.1. Primary coping

The result of the RMANOVA analysis revealed no significant differences in changes in primary coping over time between the two groups. Although not statistically significant, both groups did report a slight increase in coping (Table 2).

3.3.2. Positive affect

The results of the RMANOVA analysis failed to show significant differences in changes in positive over time between the two groups. Positive affect improved over time and affect did not differ between the two groups.

3.3.3. Mindfulness

The results of the RMANOVA analysis revealed no significant interaction between group and time. There also were no significant main effects of time, or group. Although not statistically significant, mindfulness tended to increase from before to after interventions.

4. Discussion

4.1. Summary

Aims of the current study were to evaluate the feasibility of a MC program for urban-dwelling, at-risk adolescents and to evaluate the effectiveness of a MC intervention to improve primary coping,

positive affect and trait mindfulness. Most enrolled participants completed the interventions and study measures and perceived interventions as unintrusive and valuable. Taken together, our results suggest that it is possible to reach, recruit, and keep adolescents at-risk for poor outcomes engaged in a 6-week mindfulness intervention (as well as attention intervention). With regard to intervention effects, there were no significant difference across intervention groups on outcomes; however, positive affect did increase over time for both groups. The increase in positive affect is a reflection that both interventions may be beneficial. A possible explanation is that the specific intervention is not vital but general quality time with a caring adult increases positive affect.

The observed changes in positive affect and mindfulness have real-life application for the girls that participated in the study. Increases in positive affect are associated with more effective coping styles, positive thoughts of self and being goal-oriented.²⁹ Increases in mindfulness are associated with increased self-control, tolerance, better concentration, increased kindness, acceptance and compassion.¹² These changes may provide a path for improved education and employment along with less substance abuse and better mental health outcomes over time. Future research following participants in a longitudinal study throughout adulthood may provide valuable information for the current state of the science for mindfulness interventions and their ability to have a lasting impact.

4.2. Strength of the study

A strength of the present research is the focus on minority girls, an understudied population. The current study also used an attentional comparison intervention in contrast to existing studies with no intervention comparison group.^{4,6,7,9,15,23} Furthermore, novel implementation strategies utilized in the present study included providing the intervention as an after-school activity on school grounds for residential students, using a standardized curriculum, and having both mindfulness and comparison groups taught by health care providers. With regard to our results, lack of statistical significance may be a product of the small sample size and not reflective of actual study outcomes. Between group effect sizes support further exploration of this research. Large effect size reflected in the calculated partial eta squared for each affect and mindfulness over time indicate preliminary reasoning for larger, well-designed studies in the future to include all at-risk youth. Due to rapid developmental changes in the teen years that occur at varied speed both boys and girls should be included in future studies to highlight gender differences.

4.3. Weakness of the study

Despite these strengths, student behavior was less than stellar at times during the interventions and adversely affected the implementation of the MC and AC. Absence of structure and discipline in the home setting may have made it difficult for students to concentrate and pay full attention during intervention sessions. A noticeable improvement in behavior occurred during a brief visit

from the headmaster. Including administration or an authority figure from the school may be a helpful strategy in future studies. Further, completion of assigned homework related to the study was not formally tracked. An improvement for future studies is to document completion of assigned homework related to the interventions. A computer-based format would make tracking of completed homework assignments manageable. Moreover, shorter tools may work better with 6th-grade girls. Use of the 57-item RSQ is time-consuming for participants. The tool's length and detail requested may have mitigated the accuracy and attention to filling out the scale. Finally, differences within and between the intervention groups that did not occur with 6-weeks of sessions may have developed if the interventions had been extended to 8 weeks or longer.

4.4. Limitations

There are limitations with this research. The study focused on adolescent females and results may not be generalizable to boys due to developmental differences. Potential for cross-contamination between the two intervention groups exists as teens interact in classes, dwell in the same building and may talk about the content of the classes. The desire to please teachers and staff at the school, as well as to please parents who wanted their children to participate may represent underlying coercion to participate. Further, adolescents wishing to avoid after-school sports or other electives may perceive the study as a time occupying alternative to less popular activities.

Instructor characteristics may have contributed to the lack of difference in outcomes between the groups. The two instructors were skilled nurse practitioners. The MC instructor was educated about the concepts, curriculum and has a personal mindfulness practice but additional training and teaching in mindfulness would be beneficial. The AC instructor's training as a Psychiatric/Mental Health Nurse Practitioner may have overlapped into her teaching AC group content. Both groups led to improvements in positive affect and mindfulness; the AC improvements may be a byproduct of mental health therapist skills of the leader.

4.5. Implications and contributions

The current study, although preliminary, adds to the growing research implementing mindfulness based interventions among at-risk, adolescent populations. Feasibility and potential benefits are positive in this, albeit small, study establishing a 'proof of concept' for a mindfulness based intervention among the most vulnerable, at-risk adolescents in a boarding school setting. It is important to further explore feasibility and clinically relevant outcomes among this population. Future studies need to investigate optimal delivery, including best tools and best session length, of mindfulness for unique populations. Taken together, mindfulness teaching is a potentially powerful tool that may benefit a broad range of adolescents and their families and should be further explored in at-risk populations.

Conflict of interest

There are no conflicts of interest to report.

Funding

There is no external funding to report.

Data availability

Data will be made available on request.

Supplementary

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.imr.2019.04.002](https://doi.org/10.1016/j.imr.2019.04.002).

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