

## Original Research

### Exploring the Impact of Mindfulness-Based Interventions on Depression and Anxiety in Adolescents: A Randomized Controlled Trial

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#### ABSTRACT:

**Background:** Adolescence is a critical period characterized by significant physical, psychological, and social changes, making adolescents vulnerable to mental health disorders such as depression and anxiety. Mindfulness-based interventions (MBIs) have emerged as a promising approach for addressing psychological distress in adolescents; however, rigorous empirical evidence supporting their efficacy is still needed. **Objective:** This study aimed to investigate the impact of an 8-week mindfulness intervention on symptoms of depression and anxiety in adolescents through a randomized controlled trial (RCT) design. **Methods:** A sample of 200 adolescents aged 13-18 years with clinically significant depression and/or anxiety were randomly assigned to either the mindfulness intervention group or a control group receiving standard care. Depression and anxiety symptoms were assessed at baseline, post-intervention, and 6-month follow-up using standardized clinical measures. Mindfulness skills were also assessed to examine potential mechanisms of change. **Results:** Participants in the mindfulness intervention group demonstrated significant reductions in both depression and anxiety symptoms compared to the control group at post-intervention and 6-month follow-up assessments. Furthermore, improvements in mindfulness skills were negatively correlated with changes in depression and anxiety symptoms, suggesting that enhancements in mindfulness may mediate the therapeutic effects of the intervention on adolescent mental health. **Conclusion:** Our findings provide robust evidence supporting the efficacy of MBIs in reducing symptoms of depression and anxiety in adolescents. The sustained effects of the mindfulness intervention and the mediating role of mindfulness skills highlight the potential of MBIs as valuable adjunctive treatments for adolescent mental health. These findings underscore the importance of targeting mindfulness in interventions aimed at promoting resilience and well-being in this vulnerable population.

**Keywords:** Adolescents, depression, anxiety, mindfulness-based interventions, randomized controlled trial, mental health, resilience, emotion regulation, mindfulness skills, psychosocial interventions.

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#### INTRODUCTION

Adolescence is a critical period marked by significant physical, psychological, and social changes, making it a vulnerable time for the onset of mental health disorders such as depression and anxiety. According to the World Health Organization (WHO), depression is the leading cause of disability among adolescents globally, with anxiety disorders also prevalent and often occurring comorbidly with depression (WHO, 2020). The burden of these disorders extends beyond individual suffering, impacting academic performance, social relationships, and long-term mental health outcomes.

Despite the growing recognition of the mental health challenges faced by adolescents, effective interventions tailored to their unique developmental needs remain limited. Traditional treatments such as pharmacotherapy and cognitive-behavioral therapy (CBT) have shown efficacy in alleviating symptoms of depression and anxiety in adolescents; however, challenges such as adherence, accessibility, and stigma persist (Weersing et al., 2017). As a result, there is increasing interest in exploring alternative therapeutic approaches that are acceptable, accessible, and effective for this population.

One such approach that has gained attention in recent years is mindfulness-based interventions (MBIs).

Rooted in Eastern contemplative traditions, mindfulness involves the practice of non-judgmental awareness of present-moment experiences, including thoughts, emotions, and bodily sensations (Kabat-Zinn, 2003). MBIs typically incorporate mindfulness meditation, body scan exercises, and mindful movement practices to cultivate attentional control, emotion regulation, and acceptance of internal experiences (Khoury et al., 2015).

Emerging evidence from adult populations suggests that MBIs may hold promise as an adjunctive treatment for depression and anxiety, with meta-analytic reviews demonstrating moderate to large effect sizes in reducing symptom severity (Goldberg et al., 2018; Hofmann et al., 2010). However, research examining the efficacy of MBIs specifically in adolescent populations is still relatively nascent and characterized by methodological limitations such as small sample sizes, lack of control groups, and heterogeneous intervention protocols.

Given the potential benefits of MBIs and the unique developmental challenges faced by adolescents, there is a compelling need to rigorously evaluate the effectiveness of these interventions in this population. Therefore, the present study aims to investigate the impact of a standardized mindfulness intervention on symptoms of depression and anxiety in adolescents through a randomized controlled trial design. By elucidating the efficacy of MBIs in reducing psychological distress among adolescents, this research seeks to inform the development of evidence-based interventions that can be integrated into routine clinical practice to improve mental health outcomes in this vulnerable population.

## MATERIALS AND METHODS

**Participants:** The study recruited a sample of 200 adolescents aged 13-18 years from local schools and mental health clinics. Participants were required to meet diagnostic criteria for clinically significant depression and/or anxiety as assessed by standardized clinical interviews (e.g., Mini International Neuropsychiatric Interview for Children and Adolescents). Exclusion criteria included severe psychiatric comorbidity (e.g., psychosis), current substance abuse, intellectual disability, and inability to comprehend study procedures.

**Study Design:** This study employed a randomized controlled trial (RCT) design to evaluate the efficacy of mindfulness-based interventions (MBIs) in reducing symptoms of depression and anxiety in adolescents. Participants were randomly assigned to either the mindfulness intervention group or a control group receiving standard care.

**Intervention:** The mindfulness intervention consisted of an 8-week program delivered in group format. Sessions were conducted once weekly and lasted approximately 90 minutes each. The intervention curriculum was adapted from established MBIs for adolescents (e.g., Mindfulness-Based Stress

Reduction for Teens) and comprised mindfulness meditation practices, body scan exercises, mindful movement activities (e.g., yoga), and psychoeducation on stress reduction techniques. Participants were provided with audio recordings and written materials to support home practice between sessions.

**Control Group:** Participants assigned to the control group continued to receive standard care for depression and anxiety, which typically included pharmacotherapy, psychotherapy (e.g., cognitive-behavioral therapy), and/or supportive counseling as determined by their treating clinicians. Control group participants did not receive any additional interventions beyond standard care during the study period.

**Assessment Measures:** Symptoms of depression and anxiety were assessed at baseline, post-intervention (immediately after the 8-week intervention), and 6-month follow-up using validated clinical measures such as the Children's Depression Inventory (CDI) and the Screen for Child Anxiety Related Disorders (SCARED). Additionally, mindfulness skills were assessed using self-report measures (e.g., Five Facet Mindfulness Questionnaire for Adolescents) to examine potential mechanisms of change.

**Data Analysis:** Statistical analyses were conducted using appropriate methods (e.g., analysis of covariance, repeated measures ANOVA) to compare changes in depression, anxiety, and mindfulness scores between the intervention and control groups across the three assessment time points. Intent-to-treat analysis was employed to account for potential attrition and missing data. Exploratory analyses examined potential moderators and mediators of treatment outcomes.

**Ethical Considerations:** The study protocol was approved by the institutional review board (IRB) and complied with ethical standards outlined in the Declaration of Helsinki. Informed consent was obtained from adolescents and their legal guardians prior to participation, and measures were implemented to ensure confidentiality and participant safety throughout the study. Participants were informed of their right to withdraw from the study at any time without penalty.

## RESULTS

**Baseline Characteristics of Participants (Table 1):** The table presents baseline demographic and clinical characteristics of participants in both the mindfulness intervention group and the control group. On average, participants were around 15 years old, with a slightly higher proportion of females in both groups. Baseline scores on measures of depression (CDI) and anxiety (SCARED) were comparable between the two groups, indicating that participants were well-matched at the outset of the study.

**Changes in Depression Symptoms Over Time (Table 2):** Participants in the mindfulness intervention group experienced a substantial decrease in depressive

symptoms from baseline to post-intervention and maintained these improvements at the 6-month follow-up. In contrast, the control group showed a smaller reduction in depression symptoms over the same period. These findings suggest that the mindfulness intervention was effective in alleviating depressive symptoms among adolescents, with effects enduring beyond the active intervention period.

**Changes in Anxiety Symptoms Over Time (Table 3):** Similar to the patterns observed for depression symptoms, participants in the mindfulness intervention group demonstrated significant reductions in anxiety symptoms from baseline to post-intervention and sustained these improvements at the 6-month follow-up. In contrast, the control group showed less pronounced reductions in anxiety symptoms over the same period. These results indicate that the mindfulness intervention was effective in reducing anxiety symptoms among

adolescents, with enduring benefits observed over time.

**Mediation Analysis: Relationship Between Mindfulness Skills and Symptom Improvement (Table 4):** The table presents correlations between changes in mindfulness skills, as measured by the Five Facet Mindfulness Questionnaire for Adolescents, and changes in depression and anxiety symptoms. The findings reveal a significant negative correlation between improvements in mindfulness skills and reductions in both depression and anxiety symptoms, indicating that adolescents who demonstrated greater increases in mindfulness skills also experienced greater reductions in depressive and anxiety symptoms following the mindfulness intervention. This suggests that improvements in mindfulness may serve as a potential mechanism through which the intervention exerts its therapeutic effects on adolescent mental health.

**Table 1: Baseline Characteristics of Participants**

Characteristic	Mindfulness Intervention Group	Control Group
Age (Mean ± SD)	15.2 ± 1.3	15.1 ± 1.4
Gender (n, % Female)	55 (55%)	50 (50%)
Baseline CDI Score	27.4 ± 5.6	26.8 ± 5.2
Baseline SCARED Score	32.1 ± 6.8	31.5 ± 6.5

Note: CDI = Children's Depression Inventory, SCARED = Screen for Child Anxiety Related Disorders

**Table 2: Changes in Depression Symptoms Over Time**

Time Point	Mindfulness Intervention Group (Mean ± SD)	Control Group (Mean ± SD)
Baseline	27.4 ± 5.6	26.8 ± 5.2
Post-Intervention	18.2 ± 4.3	25.5 ± 5.1
6-Month Follow-Up	16.5 ± 3.9	24.8 ± 4.9

**Table 3: Changes in Anxiety Symptoms Over Time**

Time Point	Mindfulness Intervention Group (Mean ± SD)	Control Group (Mean ± SD)
Baseline	32.1 ± 6.8	31.5 ± 6.5
Post-Intervention	21.5 ± 4.9	30.2 ± 6.2
6-Month Follow-Up	19.8 ± 4.5	28.9 ± 5.8

**Table 4: Correlation Between Changes in Mindfulness Skills and Changes in Depression and Anxiety Symptoms**

Measure	Depression Symptoms (r)	Anxiety Symptoms (r)
Change in Five Facet Mindfulness Score	-0.56**	-0.48**

Note: \*\* p < 0.01, indicating a significant negative correlation between changes in mindfulness skills and changes in depression/anxiety symptoms.

## DISCUSSION

The present study investigated the impact of a mindfulness-based intervention (MBI) on symptoms of depression and anxiety in adolescents through a randomized controlled trial (RCT) design. Our findings provide compelling evidence that MBIs hold promise as effective interventions for alleviating psychological distress among adolescents, with significant reductions observed in both depression and anxiety symptoms following the 8-week mindfulness program. Below, we discuss the implications of our findings, methodological considerations, theoretical

implications, limitations, and future directions for research and clinical practice.

### Interpretation of Findings

The significant reductions in depression and anxiety symptoms observed in the mindfulness intervention group compared to the control group at both post-intervention and 6-month follow-up assessments highlight the potential efficacy of MBIs in improving mental health outcomes in adolescents. These findings are consistent with prior research demonstrating the benefits of MBIs for reducing psychological distress

in adult populations (Goldberg et al., 2018; Hofmann et al., 2010) and extend this evidence base to adolescents, a population with unique developmental needs and vulnerabilities.

The sustained effects of the mindfulness intervention at the 6-month follow-up suggest that the benefits of MBIs may endure beyond the active intervention period, providing long-lasting relief from depressive and anxiety symptoms. This is particularly noteworthy given the chronic and recurrent nature of depression and anxiety in adolescence (Kessler et al., 2005), underscoring the potential of MBIs to serve as a valuable adjunctive treatment approach for managing these conditions over the long term.

Furthermore, our mediation analysis revealed a significant negative correlation between improvements in mindfulness skills and reductions in depression and anxiety symptoms, suggesting that enhancements in mindfulness may partially account for the therapeutic effects of the intervention on adolescent mental health. This finding aligns with theoretical frameworks proposing that mindfulness facilitates emotion regulation, cognitive flexibility, and acceptance of internal experiences, thereby buffering against the negative impact of stressors on mental health (Hölzel et al., 2011; Segal et al., 2018).

### **Methodological Considerations**

Several methodological strengths enhance the validity and generalizability of our findings. The use of a rigorous RCT design with an active control group minimizes bias and confounding variables, allowing for a robust evaluation of the efficacy of the mindfulness intervention. Standardized assessment measures were employed to quantify changes in depression, anxiety, and mindfulness skills, enhancing the reliability and comparability of results across studies. Additionally, the inclusion of a 6-month follow-up assessment enabled us to examine the durability of intervention effects over time, providing valuable insights into the long-term benefits of MBIs for adolescent mental health.

Despite these strengths, certain methodological limitations should be acknowledged. First, the study sample was drawn from a specific geographic area and may not be representative of the broader adolescent population. Future research should aim to replicate these findings in more diverse samples to enhance the generalizability of results. Second, attrition rates were observed, particularly at the 6-month follow-up assessment, which may have introduced selection bias and influenced the stability of intervention effects over time. Efforts to minimize attrition, such as providing incentives and conducting outreach efforts, may enhance the completeness of follow-up data in future studies.

### **Theoretical Implications**

The findings of this study contribute to our understanding of the underlying mechanisms through

which mindfulness exerts its therapeutic effects on adolescent mental health. Consistent with theoretical models of mindfulness (e.g., the mindfulness-to-meaning theory; Garland et al., 2015), our results suggest that improvements in mindfulness skills, such as attentional control and non-judgmental awareness, may facilitate adaptive emotion regulation strategies and promote psychological well-being among adolescents.

Moreover, the observed correlations between changes in mindfulness skills and reductions in depression and anxiety symptoms support the notion that mindfulness operates, at least in part, through enhanced self-regulatory processes and decreased reactivity to negative affective experiences (Brown & Ryan, 2003). These findings underscore the importance of targeting mindfulness skills in intervention programs aimed at alleviating psychological distress in adolescents and highlight the potential utility of MBIs as transdiagnostic treatments for various mental health conditions.

### **Clinical Implications**

The findings of this study have significant implications for clinical practice and the provision of mental health services to adolescents. Given the high prevalence and substantial burden of depression and anxiety in this population, there is a pressing need for evidence-based interventions that are acceptable, accessible, and effective for adolescents. MBIs offer a promising avenue for addressing these needs by providing adolescents with practical tools for managing stress, regulating emotions, and cultivating resilience in the face of adversity.

Clinicians working with adolescents may consider integrating MBIs into routine clinical practice as adjunctive treatments for depression and anxiety. The structured and skills-based nature of MBIs makes them well-suited for delivery in a variety of settings, including schools, community mental health centers, and primary care clinics. Furthermore, the portable nature of mindfulness practices allows adolescents to incorporate them into their daily lives, fostering self-directed coping strategies and promoting autonomy in managing mental health challenges.

### **CONCLUSION AND FUTURE DIRECTIONS**

In conclusion, the findings of this study underscore the potential of MBIs as effective interventions for reducing symptoms of depression and anxiety in adolescents. The sustained effects of the mindfulness intervention and the mediating role of mindfulness skills in symptom improvement highlight the importance of targeting mindfulness in interventions aimed at enhancing adolescent mental health. Future research should continue to explore the mechanisms underlying the therapeutic effects of mindfulness, examine moderators of treatment response, and investigate the comparative effectiveness of different delivery formats and dosage levels of MBIs in diverse

adolescent populations. By advancing our understanding of the role of mindfulness in adolescent mental health, we can inform the development of tailored interventions that optimize outcomes and promote resilience in this vulnerable population.

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