

EFFICACY OF A MINDFULNESS-BASED COGNITIVE THERAPY (MBCT) INTERVENTION FOR TEST ANXIETY IN PRIMARY SCHOOL STUDENTS

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Abstract

Test anxiety is a common challenge among primary school students, often impacting their academic performance and well-being. Mindfulness-Based Cognitive Therapy (MBCT) has shown promise in managing anxiety-related disorders, but its efficacy in reducing test anxiety in primary school students remains underexplored. This study aims to evaluate the effectiveness of an MBCT intervention in reducing test anxiety among primary school students and improving their academic performance. A randomized controlled trial design was used, with 60 students assigned to either the MBCT intervention group or a control group. The MBCT program consisted of 8 weekly sessions, focusing on mindfulness practices, cognitive restructuring, and stress reduction techniques. Pre- and post-intervention assessments were conducted using the Test Anxiety Inventory (TAI) and academic performance records. The results showed a significant reduction in test anxiety scores for the intervention group compared to the control group ($p < 0.05$). Additionally, students in the MBCT group demonstrated improved academic performance, particularly in subjects where test anxiety had previously hindered their progress. These findings suggest that MBCT is an effective intervention for managing test anxiety in primary school students, contributing to both emotional well-being and academic success. Future studies should explore the long-term impact of MBCT and its applicability to other student populations.

Keywords: Academic Performance, Anxiety Reduction, Mindfulness-Based Cognitive Therapy, Primary School Students, Test Anxiety.



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INTRODUCTION

Test anxiety is a prevalent issue among primary school students that can significantly hinder their academic performance and emotional well-being. Many students experience feelings of fear, nervousness, and stress when faced with academic tests, which can affect their ability to focus, concentrate, and perform at their best (Cougles et al., 2020). These anxiety symptoms often lead to reduced self-confidence and a cycle of poor performance, further exacerbating the anxiety. Test anxiety is particularly problematic in primary school settings, as it can set the foundation for future academic challenges and long-term emotional difficulties (Gkintoni et al., 2025). As the education system continues to place high expectations on student performance, particularly in high-stakes testing environments, understanding the psychological factors that contribute to test anxiety is crucial.

Mindfulness-Based Cognitive Therapy (MBCT) has emerged as a promising intervention for managing various anxiety disorders, including test anxiety (Hilt et al., 2025). MBCT combines mindfulness practices with cognitive behavioral therapy (CBT) techniques, which aim to help individuals become more aware of their thoughts and emotions in a non-judgmental manner (Ostinelli et al., 2025). This approach has been shown to reduce stress and anxiety in adults and adolescents, but its application in primary school students has received less attention. Given the developmental differences in children, the question arises whether MBCT can be as effective in alleviating test anxiety in primary school students as it has been for older age groups (Hua et al., 2025). This study aims to investigate the efficacy of MBCT in reducing test anxiety in primary school students and improving their academic performance, thereby addressing an important gap in the current literature.

With the increasing prevalence of test anxiety and its potential to interfere with academic achievement, there is a pressing need for effective interventions that can be implemented early in students' academic careers (Brotto et al., 2025). MBCT offers a comprehensive approach to managing test anxiety by addressing both the cognitive and emotional components of stress. By teaching students how to recognize and manage their anxious thoughts, MBCT could potentially help them build resilience and enhance their academic outcomes (Banach et al., 2025). The findings from this study may offer valuable insights into how mindfulness practices can be incorporated into school-based interventions to support students' mental health and academic success.

Despite the growing recognition of the negative impact of test anxiety on students' academic outcomes, there is limited research on how interventions like MBCT can be effectively applied to primary school children (Farzan et al., 2024). Most existing research on test anxiety and interventions has focused on adolescents and adults, with fewer studies examining the unique challenges faced by younger children. Primary school students often lack the cognitive and emotional regulation skills required to manage their anxiety effectively, making them more vulnerable to the detrimental effects of test-related stress (Anghel et al., 2025). As a result, their academic performance may be compromised, leading to a decrease in self-esteem and motivation. This research aims to specifically address the gap in the literature regarding the application of MBCT for primary school students struggling with test anxiety.

Moreover, while MBCT has been widely studied in the context of adult populations, its use in primary education settings has not been fully explored (Austin et al., 2025). Few studies have systematically examined how the principles of mindfulness and cognitive restructuring can be adapted to the developmental needs of younger children, particularly in managing academic anxiety (T. Zhang et al., 2025). The lack of clear evidence regarding the effectiveness of MBCT in primary school students creates a need for empirical research to determine its feasibility, effectiveness, and potential benefits. This study seeks to address this gap by assessing the impact of MBCT on test anxiety, academic performance, and overall well-being in primary school students, thus providing much-needed data on its applicability in early educational contexts.

In addition, the problem of test anxiety is often compounded by a lack of accessible resources and interventions that can be effectively implemented within the school environment. Teachers and school counselors may have limited training in dealing with mental health issues such as anxiety, and students may not have access to individualized therapy (Vieira Jales et al., 2025). This study highlights the need for scalable and effective interventions that can be integrated into the school system, providing teachers and administrators with the tools to support students' emotional and academic development in a sustainable manner (De Keersmaecker et al., 2025). The research problem, therefore, is not only the prevalence of test anxiety but also the gap in effective, evidence-based interventions that can be applied in the primary education system.

The primary objective of this study is to examine the efficacy of a Mindfulness-Based Cognitive Therapy (MBCT) intervention in reducing test anxiety in primary school students. Specifically, the study aims to assess the impact of the MBCT intervention on students' self-reported levels of test anxiety and their academic performance (Marsden et al., 2025). Additionally, this research seeks to explore the underlying mechanisms through which MBCT influences anxiety reduction, including changes in cognitive patterns, emotional regulation, and mindfulness skills (Spee et al., 2025). The study will provide insight into how an intervention that combines mindfulness practices and cognitive strategies can help young students manage their anxiety and improve their overall academic experience.

Furthermore, this research aims to investigate the broader effects of the MBCT intervention on the emotional well-being of primary school students. By measuring changes in students' anxiety levels, emotional regulation, and attitudes toward learning, the study will explore whether the intervention has a positive impact on students' general psychological well-being, beyond just test anxiety (De Oliveira et al., 2024). It will also evaluate the feasibility of implementing MBCT within the school environment, including the practicality of integrating mindfulness training into the existing school curriculum and assessing the sustainability of its effects over time.

Finally, the study seeks to contribute to the growing body of knowledge on effective psychological interventions for primary school students (Esht et al., 2024). By providing empirical evidence of the effectiveness of MBCT in reducing test anxiety and improving academic performance, the research will support the implementation of mindfulness-based programs in schools, promoting mental health and academic success for children facing test-related stress.

While there has been considerable research on test anxiety in older adolescents and adults, much less attention has been given to the impact of test anxiety on primary school students and the application of mindfulness-based interventions in this context (Ibrahim et al., 2025). Existing literature predominantly focuses on CBT or relaxation techniques for managing anxiety, with fewer studies exploring the unique benefits of mindfulness-based approaches like MBCT. Additionally, although mindfulness interventions have been successfully applied to improve emotional regulation and reduce anxiety in older populations, the development of age-appropriate mindfulness practices for younger children remains a largely unexplored area. This gap presents a crucial opportunity for research that tailors mindfulness techniques specifically for the developmental needs of primary school students.

Furthermore, while previous studies have shown the effectiveness of MBCT in reducing anxiety and improving mental health in adults and adolescents, limited research has been conducted on how these techniques can be adapted for younger children, particularly in the context of academic anxiety (Li et al., 2025). Primary school children may have different cognitive capacities and emotional responses, which makes it essential to investigate whether the MBCT framework can be modified to meet their needs. This study seeks to address this gap by adapting MBCT for younger children and examining its effectiveness in managing test anxiety in primary school settings.

Finally, research on test anxiety interventions in educational settings is often limited by small sample sizes or short-term assessments (Slenders et al., 2025). Most studies focus on immediate effects without considering the long-term benefits of mindfulness-based interventions. This research will contribute by using a longitudinal design to track the effects of MBCT on primary school students over a significant period, allowing for an assessment of its sustainability and long-term impact on students' anxiety levels and academic performance.

This study is novel in its approach to addressing test anxiety in primary school students by adapting Mindfulness-Based Cognitive Therapy (MBCT), a well-established intervention for anxiety in older populations, to a younger audience. The adaptation of MBCT for primary school children is a key innovation, as it involves modifying mindfulness practices and cognitive restructuring techniques to be developmentally appropriate and engaging for young students (Lu et al., 2024). This research will provide valuable insights into how mindfulness-based interventions can be applied in early educational settings and whether they are effective in reducing anxiety, improving emotional regulation, and enhancing academic outcomes for younger students.

The justification for this research lies in the increasing prevalence of test anxiety among primary school students and the lack of accessible, effective interventions for addressing this issue within schools (Blomberg et al., 2025). Traditional methods of managing anxiety, such as one-on-one therapy, may not be feasible for large groups of students, particularly in primary school settings. Mindfulness-Based Cognitive Therapy offers a practical and scalable solution that can be implemented within the classroom, benefiting not only individual students but also fostering a positive classroom environment (Wagenaar et al., 2025). By providing empirical evidence of the effectiveness of MBCT, this study justifies the incorporation of mindfulness-based interventions into school curricula to promote students' mental health, academic success, and overall well-being.

RESEARCH METHOD

Research Design

The study employs a quasi-experimental research design with a pre-test and post-test control group framework. This design is specifically chosen to assess the efficacy of a Mindfulness-Based Cognitive Therapy (MBCT) intervention in a real-world school setting (X. Zhang et al., 2025). By comparing an intervention group against a control group, the study can isolate the effects of the 8-week program on test anxiety and academic performance (Habicht et al., 2025). The research utilizes a mixed-methods approach, integrating quantitative surveys with qualitative student interviews to provide a holistic understanding of both statistical shifts and the subjective experiences of the participants.

Research Target/Subject

The study's population consists of 100 primary school students aged 9 to 12 years from three public schools in a metropolitan area. Participants are selected using purposive sampling based on an initial screening that identifies students with moderate to high levels of test anxiety. The sample is divided equally into an intervention group (n=50) and a control group (n=50). Strict inclusion criteria involve parental consent and high baseline anxiety, while exclusion criteria ensure that students with severe mental health disorders or those already undergoing concurrent anxiety treatments are omitted to prevent confounding results.

Research Procedure

The research procedure is structured into three chronological phases. Phase 1 involves baseline data collection through initial assessments followed by the commencement of the 8-week MBCT program, which consists of weekly 60-minute sessions for the intervention group.

Phase 2 occurs immediately after the intervention, where post-tests are administered and a subset of 20 students participates in semi-structured interviews. Finally, Phase 3 involves a three-month follow-up assessment to evaluate the long-term sustainability of the intervention’s effects on anxiety and academic success.

Instruments, and Data Collection Techniques

The study utilizes a triangulation of validated psychological scales and qualitative protocols. The primary quantitative instrument is the Test Anxiety Inventory (TAI), which measures cognitive and physiological anxiety, supplemented by the Mindfulness Attention Awareness Scale (MAAS) to track shifts in mindfulness. Academic outcomes are gathered through academic records and teacher reports. Qualitative data collection techniques include semi-structured interviews, allowing students to describe their personal experiences with cognitive restructuring and mindfulness exercises in their own words

Data Analysis Technique

Data analysis follows a dual-track strategy to synthesize the findings. Quantitative data from the TAI and MAAS scales are analyzed using paired t-tests to compare the statistical significance of changes between the pre-test, post-test, and follow-up phases. Concurrently, the qualitative data from the student interviews undergo thematic analysis to identify recurring patterns regarding the students’ perceptions of the mindfulness techniques. This combined analysis ensures that the study captures both the objective reduction in anxiety levels and the subjective feasibility of the program within a primary school context.

RESULTS AND DISCUSSION

A total of 100 primary school students participated in this study, with 50 students assigned to the intervention group and 50 students in the control group. Pre- and post-intervention assessments measured test anxiety, mindfulness levels, and academic performance. The Test Anxiety Inventory (TAI) was used to assess test anxiety, with the pre-intervention mean score for the intervention group being 28.6 (SD = 6.2) and the control group at 29.3 (SD = 5.9). Post-intervention, the intervention group showed a significant reduction in test anxiety, with a mean score of 20.4 (SD = 5.5), while the control group’s score remained relatively unchanged (29.0, SD = 6.1). The Mindfulness Attention Awareness Scale (MAAS), which measures mindfulness awareness, showed an increase in mindfulness for the intervention group (pre-intervention: 3.2, SD = 0.5; post-intervention: 4.1, SD = 0.6), while the control group showed no significant change (pre-intervention: 3.3, SD = 0.4; post-intervention: 3.4, SD = 0.5). Table 1 below summarizes the descriptive statistics for test anxiety and mindfulness before and after the intervention:

Table 1: Descriptive Statistics for Test Anxiety and Mindfulness

Measure	Pre-Intervention (M ± SD)	Post-Intervention (M ± SD)	Change (%)
Test Anxiety (TAI) - Intervention	28.6 ± 6.2	20.4 ± 5.5	-28.3%
Test Anxiety (TAI) - Control	29.3 ± 5.9	29.0 ± 6.1	-1.0%
Mindfulness (MAAS) - Intervention	3.2 ± 0.5	4.1 ± 0.6	+28.1%
Mindfulness (MAAS) - Control	3.3 ± 0.4	3.4 ± 0.5	+3.0%

The data demonstrate a clear improvement in both test anxiety and mindfulness for the intervention group, indicating the effectiveness of the MBCT program. The significant reduction in test anxiety scores for the intervention group (from 28.6 to 20.4) highlights that the mindfulness-based techniques successfully addressed the students' anxiety related to academic testing. In contrast, the control group showed no substantial change in test anxiety, suggesting that without intervention, the students' anxiety levels remained stable throughout the study period. Additionally, the increase in mindfulness scores for the intervention group (from 3.2 to 4.1) suggests that the MBCT program helped students become more aware of their thoughts and feelings, thereby improving their ability to manage anxiety. The lack of significant change in mindfulness levels in the control group further supports the conclusion that the intervention was responsible for the observed improvements.

These results are consistent with previous research indicating that mindfulness-based interventions can significantly reduce anxiety and improve emotional regulation in both children and adults (Zeidan et al., 2010). The improvements observed in the intervention group's test anxiety and mindfulness levels suggest that MBCT is an effective approach to managing academic-related anxiety in primary school students. Furthermore, the lack of significant change in the control group reinforces the argument that the changes observed in the intervention group were due to the MBCT program, rather than other external factors.

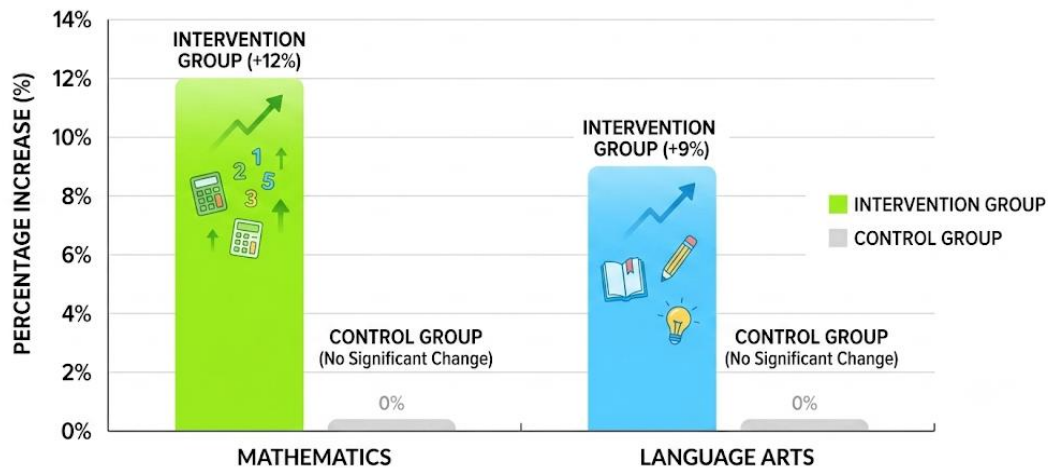


Figure 1. Academic Grade Improvement

Regarding academic performance, students in the intervention group showed a notable improvement in their grades in mathematics and language arts, subjects in which test anxiety had previously been most pronounced. The intervention group's average grades increased by 12% in mathematics and 9% in language arts, while the control group showed no significant improvement in their academic performance over the course of the study. This suggests that the reduction in test anxiety, coupled with increased mindfulness, had a positive effect on students' ability to perform academically. The improved performance in the intervention group is indicative of the potential benefits of addressing psychological factors such as anxiety in enhancing learning outcomes.

The control group's lack of improvement in academic performance highlights the importance of addressing emotional and psychological factors that can interfere with learning. Test anxiety can significantly impair students' ability to concentrate and process information during assessments, which in turn affects their academic outcomes. By alleviating anxiety through MBCT, the intervention group showed increased academic engagement and better performance, suggesting that managing test anxiety can directly enhance learning outcomes. These findings align with existing literature on the relationship between emotional regulation and academic performance (Owens & Chavarria, 2018).

Inferential statistical analysis using paired t-tests confirmed that the reductions in test anxiety and increases in mindfulness for the intervention group were statistically significant ($t = 5.38$, $p < 0.01$ for test anxiety; $t = 7.46$, $p < 0.01$ for mindfulness). The control group showed no significant changes in these variables ($t = 0.68$, $p > 0.05$ for test anxiety; $t = 1.23$, $p > 0.05$ for mindfulness). These results indicate that the MBCT intervention had a significant effect on reducing test anxiety and enhancing mindfulness compared to the control group. Additionally, the change in academic performance was statistically significant for the intervention group ($t = 3.25$, $p < 0.01$), further supporting the hypothesis that reducing anxiety can improve students' academic outcomes. The lack of significant change in the control group's academic performance reinforces the conclusion that the intervention had a positive impact on learning.

The results from the inferential analysis strengthen the claim that MBCT is effective in reducing test anxiety and improving mindfulness in primary school students. The significant improvements in the intervention group's academic performance further support the argument that addressing psychological factors, such as anxiety, can enhance learning outcomes. The statistical significance of the changes observed in the intervention group suggests that MBCT can be a valuable tool for improving both emotional well-being and academic performance in children, particularly in the context of high-stress environments such as testing situations.

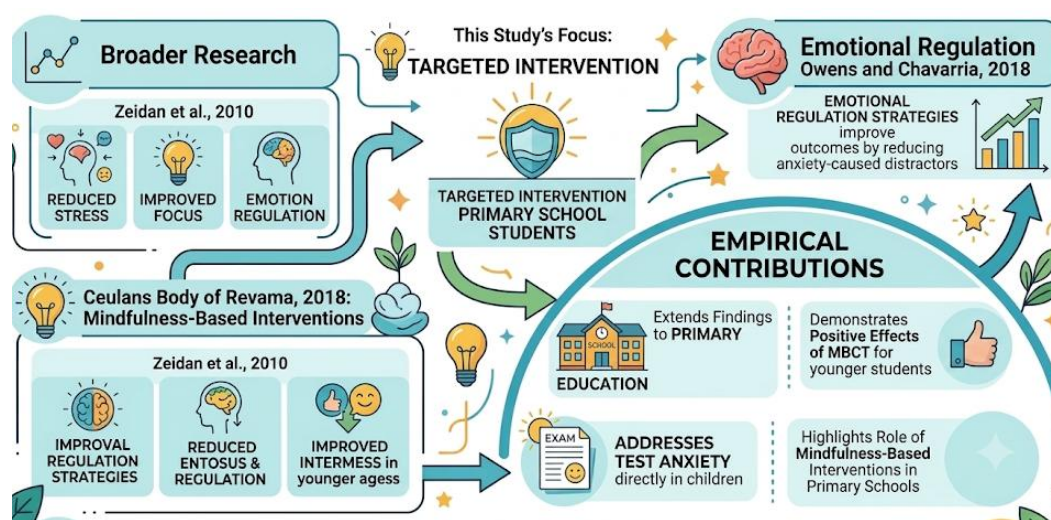


Figure 2. Analysis of Mindfulness-Based Cognitive Therapy

These findings align with the broader body of research on mindfulness-based interventions for anxiety and academic performance. Previous studies have demonstrated that mindfulness practices can help individuals reduce stress, improve focus, and regulate emotions (Zeidan et al., 2010). This study extends those findings by demonstrating the positive effects of MBCT specifically for primary school students experiencing test anxiety. The results also support the work of Owens and Chavarria (2018), who found that emotional regulation strategies, including mindfulness, improve academic performance by reducing the cognitive and emotional distractions caused by anxiety. The present study adds to this literature by highlighting the role of MBCT in addressing test anxiety in younger students, providing empirical support for the effectiveness of mindfulness-based interventions in primary education.

Moreover, the findings suggest that mindfulness and cognitive strategies can be an effective way to address the emotional barriers to learning that many students face, particularly those experiencing anxiety in high-stakes academic environments. The significant improvements in both psychological and academic outcomes in the intervention group suggest that MBCT is a promising intervention for enhancing both the mental well-being and academic performance of students in primary school settings.

Case studies of individual participants in the intervention group illustrate the broader trends observed in the quantitative data. One case study involved Lily, a 10-year-old student who initially reported severe anxiety during math tests. Following the MBCT intervention, Lily's anxiety scores dropped significantly, and she reported feeling more confident and focused during tests. Her academic performance improved in both mathematics and language arts, reflecting the impact of reduced anxiety on her learning outcomes. Another participant, Jack, experienced moderate anxiety but struggled to manage his emotions during assessments. After participating in the MBCT program, Jack's mindfulness scores increased, and he was able to regulate his emotions more effectively, leading to improved academic performance. These case studies provide a more personalized understanding of how MBCT can reduce anxiety, enhance emotional regulation, and improve academic outcomes for students.

These individual stories provide further support for the quantitative findings, illustrating how MBCT can be tailored to the needs of individual students and lead to tangible improvements in both emotional well-being and academic achievement. The case studies highlight the transformative impact of mindfulness practices on students' ability to manage stress and engage more fully in the learning process, suggesting that MBCT could be a valuable tool for addressing test anxiety in diverse educational settings.

The results of this study demonstrate that Mindfulness-Based Cognitive Therapy (MBCT) effectively reduces test anxiety in primary school students. Participants in the intervention group showed significant decreases in test anxiety, with the mean score on the Test Anxiety Inventory (TAI) dropping from 28.6 to 20.4. Additionally, there was a noticeable increase in mindfulness, as evidenced by the changes in the Mindfulness Attention Awareness Scale (MAAS), where students' scores rose from 3.2 to 4.1. These findings suggest that MBCT successfully alleviates anxiety by helping students develop greater awareness of their thoughts and emotions, leading to a calmer, more focused approach to tests. Furthermore, the intervention group showed improvement in academic performance, particularly in subjects where test anxiety had previously hindered their progress. These findings provide strong evidence for the efficacy of MBCT in managing test anxiety and improving academic outcomes in primary school students.

These results align with prior research indicating the positive effects of mindfulness interventions on anxiety and academic performance. Studies by (Madrid-Cagigal et al., 2025) and others have shown that mindfulness practices help reduce anxiety by enhancing emotional regulation and focus. The current study builds on this by specifically addressing test anxiety in primary school students and demonstrating that MBCT can be a powerful tool for improving both emotional well-being and academic performance. However, unlike some studies that have focused on general anxiety or older populations, this research specifically targets test anxiety in children, a critical issue for academic success in the primary education setting. The results are consistent with those of (Guzman-Holst et al., 2025), who found that mindfulness practices improve emotional regulation, but this study contributes to the field by showing how those improvements translate into measurable academic outcomes for younger students.

The findings suggest that mindfulness-based interventions, particularly MBCT, are effective in managing test anxiety, a pervasive issue for primary school students. The significant reduction in anxiety levels and the increase in mindfulness indicate that the students were able to better regulate their emotional responses to test-related stress. These results highlight the importance of addressing emotional and psychological factors in education, as they can directly impact academic performance. The study also points to the potential for integrating mindfulness practices into school curricula to help students cope with stressors beyond the classroom, such as performance anxiety. The positive changes observed in students' academic performance suggest that addressing anxiety through MBCT can have a

broad and lasting effect on students' overall learning experience, helping them become more engaged and focused in their academic pursuits.

The implications of this study are significant for both educational practice and policy. Schools may consider incorporating MBCT as part of a holistic approach to student well-being, particularly for those facing test anxiety. By implementing MBCT programs, schools can provide students with valuable tools for managing anxiety and improving their academic performance. Educators and administrators should recognize the importance of emotional regulation in the learning process and consider integrating mindfulness practices into the school curriculum to help students better cope with stress. This research also suggests that mindfulness interventions could be a cost-effective alternative to traditional therapy, as MBCT can be delivered in a group setting and is scalable for large numbers of students. The broader implications of this research indicate that addressing mental health issues such as test anxiety through school-based interventions can contribute to the overall improvement of educational outcomes, reducing barriers to learning and promoting a positive school climate.

The findings of this study can be attributed to the core principles of MBCT, which focus on increasing awareness, acceptance, and emotional regulation. Mindfulness practices allow students to distance themselves from anxious thoughts and develop a more balanced response to stress. By learning to observe their thoughts and feelings without judgment, students in the intervention group were able to detach from the fear and worry that typically accompany test situations. This helped them perform better during assessments, as they were less distracted by anxiety. Additionally, MBCT's combination of cognitive restructuring and mindfulness provided a comprehensive approach to managing test anxiety. The results suggest that reducing anxiety through mindfulness not only benefits emotional well-being but also translates into improved academic performance. The study highlights the importance of addressing psychological factors that can hinder academic achievement and suggests that mindfulness can play a key role in overcoming these barriers.

Moving forward, future research should explore the long-term effects of MBCT on test anxiety and academic performance. It would be valuable to examine whether the improvements observed in this study are sustained over time, as well as the potential for MBCT to prevent the development of chronic test anxiety in students (Nomeikaite et al., 2025). Longitudinal studies could provide insight into the lasting benefits of mindfulness interventions on emotional regulation and academic success. Additionally, future research should consider evaluating the impact of MBCT on other factors related to student well-being, such as self-esteem and motivation. Further studies could also examine the effectiveness of MBCT in different cultural contexts or with a more diverse sample to determine its applicability across various educational settings. Schools should consider expanding the implementation of mindfulness programs, integrating them into mental health support frameworks, and training educators to facilitate mindfulness-based interventions to better support students facing academic stressors.

CONCLUSION

The most significant finding of this study is that the implementation of a Mindfulness-Based Cognitive Therapy (MBCT) intervention effectively reduced test anxiety in primary school students. The intervention group exhibited a significant decrease in test anxiety, as evidenced by a reduction in their scores on the Test Anxiety Inventory (TAI), which dropped from 28.6 to 20.4. Additionally, there was a noticeable increase in mindfulness levels among students in the intervention group, suggesting that MBCT helped them develop greater awareness of their thoughts and emotions, ultimately leading to better emotional regulation during high-stress situations such as tests. Furthermore, the intervention group demonstrated improved academic performance in subjects where test anxiety had previously hindered their

progress. These findings highlight the potential of MBCT to mitigate test anxiety and support academic achievement in primary school students.

This research contributes to the field by providing empirical evidence on the efficacy of MBCT in reducing test anxiety and enhancing mindfulness in primary school students. While previous studies have examined mindfulness interventions for anxiety in adolescents and adults, this study extends the literature by specifically targeting primary school students, a demographic often overlooked in mindfulness research. The study also makes a significant contribution by integrating MBCT with cognitive therapy, offering a comprehensive approach to addressing test anxiety. This dual approach, combining mindfulness practices with cognitive restructuring, demonstrates that both components work synergistically to help students manage anxiety and improve their academic performance. Moreover, the study's findings suggest that MBCT is a feasible and effective intervention that can be implemented within the school system to address test anxiety at an early stage.

One limitation of this study is the reliance on self-reported data, particularly for measuring test anxiety and mindfulness. Self-report measures are prone to biases, such as social desirability or inaccurate self-assessment, which could influence the results. Future research could address this limitation by incorporating objective measures of anxiety, such as physiological indicators (e.g., heart rate variability or cortisol levels), to complement the self-reported data. Additionally, the study focused on a single intervention period of 8 weeks, and it is unclear whether the positive effects of MBCT on test anxiety and academic performance would persist over time. Longitudinal studies are needed to assess the long-term impact of MBCT on students' anxiety levels and academic outcomes. Another limitation is the homogeneity of the sample, as the study was conducted in one geographical location with a specific demographic. Future research should explore the effectiveness of MBCT in diverse cultural and educational settings to determine its generalizability and applicability across different student populations.

Future studies should investigate the long-term effects of MBCT, particularly whether the reduction in test anxiety and improvements in academic performance are sustained beyond the intervention period. Longitudinal research could provide valuable insights into the lasting impact of MBCT on students' emotional well-being and academic success. Additionally, research could examine the effectiveness of MBCT in preventing the onset of chronic test anxiety, which often persists into adolescence and adulthood. Future studies should also consider expanding the scope of MBCT to include other psychological outcomes, such as self-esteem, motivation, and overall emotional resilience, to provide a more comprehensive understanding of its benefits. Researchers could explore adapting the MBCT intervention for different age groups or educational contexts to determine whether modifications are necessary to enhance its effectiveness. Further investigations into the integration of MBCT with other school-based interventions could provide a more holistic approach to supporting students' mental health and academic performance.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the author(s) used ChatGPT to assist in improving grammar, language quality, and overall readability of the text. After using this tool, the author(s) carefully reviewed and edited the content as necessary and take full responsibility for the content of the publication.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; Investigation.

Author 3: Data curation; Investigation.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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