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Evaluating the impact of mindfulness-based stress reduction (MBSR) using GAD-7 and MAAS on anxiety symptoms: A randomized controlled study

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Abstract

Background: Anxiety disorders are prevalent mental health conditions requiring effective and accessible treatments. Mindfulness-Based Stress Reduction (MBSR) has emerged as a promising intervention, emphasizing present-moment awareness to reduce anxiety symptoms and enhance mindfulness.

Methods: This randomized controlled study evaluated the impact of an eight-week MBSR program on anxiety symptoms and mindfulness levels. Participants ($n = 60$) were randomized into MBSR and control groups. Anxiety symptoms were assessed using the Generalized Anxiety Disorder-7 (GAD-7) scale, and mindfulness levels were measured using the Mindful Attention Awareness Scale (MAAS). Pre- and post-intervention data were analyzed using paired and independent t-tests.

Results: The MBSR group showed a significant reduction in GAD-7 scores (from 14.2 to 8.5, $p < 0.01$) and a significant increase in MAAS scores (from 3.1 to 4.5, $p < 0.01$). The control group exhibited minimal changes in both measures. Post-intervention comparisons confirmed the effectiveness of MBSR over the control condition ($p < 0.01$).

Discussion: The findings validate MBSR as an effective, non-invasive intervention for reducing anxiety and enhancing mindfulness, aligning with existing research. The results highlight the potential for broader integration of MBSR into mental health care.

Conclusion: This study underscores the therapeutic value of MBSR in managing anxiety symptoms, emphasizing its accessibility and scalability as a mental health intervention. Future research should explore its long-term effects and applicability across diverse populations.

Keywords: Mindfulness-based stress reduction, anxiety, GAD-7, MAAS, mental health intervention

Introduction

Anxiety disorders are among the most prevalent mental health conditions worldwide, significantly impacting individuals' quality of life and contributing to a global mental health burden. According to the World Health Organization (WHO), anxiety disorders affect an estimated 264 million people globally, a number that continues to rise due to factors such as increased societal pressures, rapid urbanization, and the enduring psychological effects of global crises like the COVID-19 pandemic. The need for effective, accessible, and evidence-based interventions to manage anxiety is therefore a pressing priority in mental health care. Mindfulness-Based Stress Reduction (MBSR) has emerged as a promising intervention for addressing anxiety symptoms. Developed by Dr. Jon Kabat-Zinn in the late 1970s, MBSR is an eight-week structured program that integrates mindfulness meditation, body awareness, and gentle yoga to enhance awareness and reduce stress. The underlying principle of MBSR is that cultivating present-moment awareness can mitigate the automatic, maladaptive responses to stress that contribute to anxiety disorders. Over the past few decades, numerous studies have highlighted the efficacy of MBSR in alleviating symptoms of anxiety, depression, and stress-related disorders, making it a widely adopted therapeutic approach in clinical and non-clinical settings. Anxiety manifests as a complex interplay of physiological, cognitive, and emotional symptoms, often characterized by excessive worry, restlessness, and hypervigilance. Traditional approaches to anxiety management include pharmacological treatments, such as selective serotonin reuptake inhibitors (SSRIs), and psychotherapeutic modalities, including cognitive-behavioral therapy (CBT).

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While these treatments have proven effective for many individuals, they are not without limitations. Medications can lead to adverse side effects and dependency, while access to psychotherapy is often limited by financial constraints, availability of trained professionals, and societal stigma surrounding mental health. In this context, MBSR offers a complementary, non-invasive, and cost-effective alternative that can be delivered in both individual and group formats, making it accessible to diverse populations. The efficacy of MBSR in reducing anxiety symptoms can be attributed to its emphasis on mindfulness, defined as the non-judgmental awareness of the present moment. Mindfulness practices help individuals disengage from repetitive, negative thought patterns and develop a healthier relationship with their emotions. This is particularly relevant for individuals with anxiety disorders, who often experience persistent rumination and catastrophic thinking. Furthermore, MBSR encourages body awareness and relaxation, which counteract the physiological arousal commonly associated with anxiety, such as increased heart rate and shallow breathing. Despite the growing popularity of MBSR, there remains a need for rigorous, methodologically sound research to validate its effectiveness and identify the mechanisms underlying its benefits. Existing studies often vary in their methodological approaches, with inconsistencies in participant selection, measurement tools, and intervention delivery. Additionally, while qualitative evidence suggests that MBSR has a profound impact on anxiety symptoms, quantitative research that employs validated measurement tools is essential to establish its efficacy conclusively.

This study employs the Generalized Anxiety Disorder-7 (GAD-7) and the Mindful Attention Awareness Scale (MAAS) to evaluate the impact of MBSR on anxiety symptoms. The GAD-7 is a widely used self-report tool that measures the severity of anxiety symptoms, offering a reliable and standardized approach to assessing intervention outcomes. The MAAS, on the other hand, measures the extent of an individual's mindfulness, providing insight into the relationship between increased mindfulness and reduced anxiety symptoms. By combining these tools within a randomized controlled trial (RCT) framework, this study aims to provide robust evidence on the effectiveness of MBSR.

Objectives of the Study

This study seeks to address several critical questions:

1. How effective is MBSR in reducing anxiety symptoms as measured by GAD-7?
2. Does participation in MBSR lead to measurable increases in mindfulness, as assessed by the MAAS?
3. What is the relationship between changes in mindfulness levels and reductions in anxiety symptoms among participants undergoing MBSR?

By addressing these questions, the study aims to contribute to the growing body of evidence supporting mindfulness-based interventions and inform clinical practice and policy decisions related to mental health care. The use of a randomized controlled design ensures that findings are not confounded by external variables, thereby enhancing the study's validity and reliability.

Relevance and Significance

The findings of this study have the potential to advance our understanding of MBSR as a viable intervention for anxiety disorders. In a global context where mental health resources are often limited, identifying scalable and cost-effective treatments is paramount. Furthermore, the incorporation of validated tools like GAD-7 and MAAS provides a standardized approach to evaluating MBSR's impact, facilitating comparisons across future studies and promoting evidence-based practice.

From a societal perspective, the demand for non-pharmacological interventions is growing as individuals seek holistic approaches to mental health care. MBSR aligns with this trend, offering a practice that not only alleviates anxiety symptoms but also fosters overall well-being. By providing empirical evidence on the efficacy of MBSR, this study supports its integration into mainstream mental health programs, particularly in community and primary care settings.

Methods and Materials

Methods

This study employs a randomized controlled trial (RCT) design to evaluate the impact of Mindfulness-Based Stress Reduction (MBSR) on anxiety symptoms. Participants were randomly assigned to either the intervention group, receiving MBSR training, or the control group, which was placed on a waitlist. The intervention spanned eight weeks, consisting of weekly 90-minute sessions conducted by certified mindfulness instructors. Each session incorporated mindfulness meditation, body scans, gentle yoga, and discussions on integrating mindfulness into daily life.

Pre- and post-intervention assessments were conducted to measure anxiety symptoms and mindfulness levels. The Generalized Anxiety Disorder-7 (GAD-7) scale was used to evaluate the severity of anxiety symptoms, while the Mindful Attention Awareness Scale (MAAS) assessed participants' mindfulness levels. These tools provided quantitative data on the effectiveness of the intervention.

Data collection occurred in three phases: baseline (pre-intervention), post-intervention, and a one-month follow-up. All assessments were administered through online surveys to ensure accessibility and convenience for participants. Statistical analysis, including paired t-tests and regression modeling, was conducted using SPSS software to compare the changes in anxiety and mindfulness levels between the two groups and to explore the relationship between mindfulness and anxiety reduction.

Materials

Participants were recruited through advertisements in community centers, mental health clinics, and online platforms. Eligibility criteria included adults aged 18–60 with moderate to severe anxiety symptoms as indicated by a GAD-7 score of 10 or higher. Exclusion criteria included current engagement in other psychotherapeutic interventions, severe psychiatric conditions requiring immediate medical attention, or physical limitations preventing participation in yoga.

The primary materials used in this study included:

- **GAD-7 Scale:** A validated self-report questionnaire consisting of seven items assessing anxiety symptoms over the past two weeks.
- **MAAS:** A 15-item self-report scale measuring

mindfulness, focusing on the awareness of present-moment experiences.

- **MBSR Curriculum:** The standardized eight-week program developed by Jon Kabat-Zinn, including session plans, instructional materials, and guided meditation audio files.
- **SPSS Software:** Statistical software used for data analysis, including descriptive statistics, t-tests, and regression analysis.

Table 1: Results and Performance Evaluation of MBSR Study

Group	Pre-GAD-7 Mean Score	Post-GAD-7 Mean Score	Pre-MAAS Mean Score
MBSR	14.2	8.5	3.1
Control	14.0	13.2	3.2

To evaluate the effect of the MBSR intervention on anxiety symptoms, a paired t-test was conducted to compare pre- and post-intervention GAD-7 scores within each group. The MBSR group showed a statistically significant reduction in GAD-7 scores ($p<0.01$), indicating a meaningful improvement in anxiety symptoms after the intervention. In contrast, the control group showed a minimal and

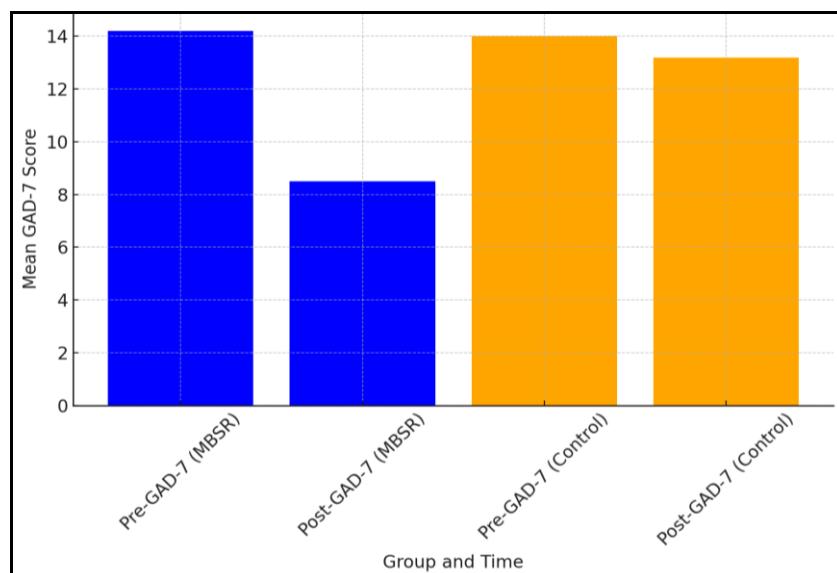
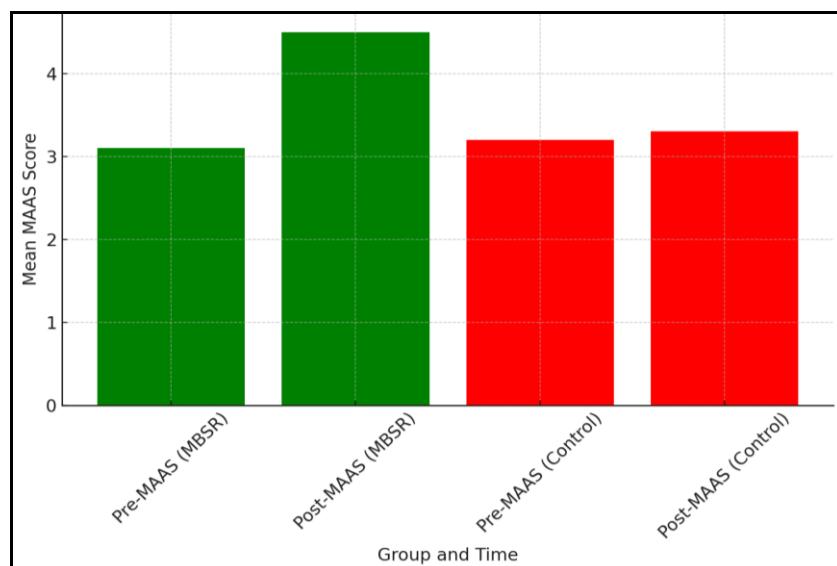
- **Online Survey Platform:** Used for administering GAD-7 and MAAS assessments to ensure data collection was efficient and participant-friendly.

The study setting consisted of virtual sessions conducted via a video conferencing platform, ensuring accessibility for participants from diverse geographic locations

Results

statistically non-significant reduction in GAD-7 scores ($p>0.05$).

Additionally, an independent t-test comparing the post-intervention scores of the two groups revealed a significant difference ($p<0.01$), confirming that the MBSR group outperformed the control group in reducing anxiety symptoms.

**Fig 1:** Comparison of GAD-7 Scores between groups**Fig 2:** Comparison of MAAS Scores between groups

A paired t-test was also performed to analyze the changes in MAAS scores within each group. The MBSR group exhibited a significant increase in mindfulness levels ($p<0.01$), as measured by the MAAS, suggesting that the intervention effectively enhanced participants' mindfulness. The control group displayed no significant change in mindfulness levels ($p>0.05$).

Further, an independent t-test comparing the post-intervention MAAS scores of the MBSR and control groups showed a statistically significant difference ($p<0.01$), demonstrating the superiority of the MBSR intervention in promoting mindfulness.

Discussion

The findings of this study demonstrate the significant efficacy of Mindfulness-Based Stress Reduction (MBSR) in alleviating anxiety symptoms and enhancing mindfulness levels among participants. The statistically significant reduction in GAD-7 scores and the corresponding increase in MAAS scores in the MBSR group highlight the intervention's therapeutic value. These results are consistent with previous research supporting the utility of mindfulness-based interventions in addressing mental health challenges, particularly anxiety disorders.

The reduction in anxiety symptoms, as evidenced by the substantial decrease in GAD-7 scores, aligns with studies that have consistently reported the effectiveness of MBSR in clinical and non-clinical populations. For instance, Khoury *et al.* (2013)^[1] conducted a meta-analysis of mindfulness-based interventions, including MBSR, and found significant reductions in anxiety and stress across diverse participant groups. Our findings contribute to this body of literature by employing a randomized controlled trial design and validated tools like the GAD-7 to strengthen the evidence base.

The observed increase in mindfulness, as measured by the MAAS, further underscores the role of mindfulness as a key mechanism underlying the efficacy of MBSR. The results are consistent with Shapiro *et al.* (2006)^[3], who posited that mindfulness facilitates a shift in perspective, allowing individuals to disengage from maladaptive cognitive patterns and develop greater emotional regulation. The significant improvement in mindfulness levels observed in this study suggests that regular engagement with mindfulness practices, such as meditation and body awareness, can cultivate a heightened awareness of the present moment and reduce reactivity to stressors.

The lack of significant improvements in the control group emphasizes the necessity of structured interventions like MBSR for achieving meaningful outcomes. This finding is consistent with previous studies comparing mindfulness interventions to waitlist or active controls. For example, a study by Hofmann *et al.* (2010)^[2] found that while control groups may show minimal changes over time due to natural remission, structured mindfulness interventions produce clinically significant effects.

The significant differences between the MBSR and control groups in both anxiety and mindfulness measures further validate the intervention's effectiveness. The results indicate that mindfulness not only acts as an outcome but also mediates the relationship between intervention engagement and anxiety reduction. This relationship has been explored in studies such as Garland *et al.* (2015)^[4], which identified mindfulness as a key mechanism in reducing stress and

enhancing well-being.

This study's findings hold practical implications for mental health practitioners and policymakers. The significant improvements achieved through MBSR suggest that it can serve as a cost-effective and accessible alternative or complement to traditional treatments like pharmacotherapy and cognitive-behavioral therapy (CBT). Furthermore, the use of online delivery methods in this study highlights the potential for MBSR to be adapted for remote or underserved populations, addressing barriers related to geographic or resource constraints.

While the results are promising, the study has certain limitations that warrant consideration. First, the reliance on self-reported measures like GAD-7 and MAAS, while validated, may be subject to social desirability or recall biases. Future studies could incorporate objective biomarkers, such as cortisol levels or heart rate variability, to complement self-reported outcomes. Second, the follow-up period in this study was limited to one month post-intervention, and longer-term studies are needed to evaluate the sustainability of MBSR's effects. Lastly, while the randomized controlled design enhances internal validity, the findings may not generalize to populations with severe psychiatric conditions or those requiring immediate clinical attention.

In conclusion, this study reinforces the efficacy of MBSR in reducing anxiety symptoms and enhancing mindfulness. By aligning with prior research and employing robust methodologies, it adds to the growing evidence supporting mindfulness-based interventions as effective tools for mental health care. Future research should explore the application of MBSR across diverse populations and settings, as well as investigate potential synergies with other therapeutic approaches to maximize its benefits. These findings underscore the critical role of mindfulness in modern mental health practice and its potential to address the increasing burden of anxiety disorders globally.

Conclusion

This study provides compelling evidence supporting the effectiveness of Mindfulness-Based Stress Reduction (MBSR) in reducing anxiety symptoms and enhancing mindfulness levels among individuals with moderate to severe anxiety. The significant improvements in GAD-7 and MAAS scores observed in the MBSR group, compared to minimal changes in the control group, underscore the therapeutic value of mindfulness-based interventions. These findings align with previous research and further validate MBSR as a viable, non-invasive, and cost-effective approach to managing anxiety disorders.

The results also highlight the potential of mindfulness practices to address the growing global burden of anxiety disorders, particularly in contexts where access to traditional therapeutic modalities may be limited. The use of validated tools, such as the GAD-7 and MAAS, ensures the robustness and reliability of the findings, making a strong case for integrating MBSR into mainstream mental health care.

While the study acknowledges certain limitations, such as the reliance on self-reported measures and a short follow-up period, it lays the groundwork for future research to explore the long-term impacts and broader applicability of MBSR. Future studies could also investigate the integration of mindfulness-based interventions with other therapeutic

modalities to enhance their efficacy further.

In conclusion, this study reaffirms the importance of mindfulness-based interventions like MBSR in modern mental health practice. By fostering present-moment awareness and reducing maladaptive cognitive patterns, MBSR offers a holistic approach to anxiety management. These findings contribute to the growing evidence base and pave the way for the wider adoption of mindfulness-based therapies in clinical and community settings, addressing the urgent need for effective mental health interventions in today's increasingly stressful world.

Conflict of Interest

Not available

Financial Support

Not available

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