Mindfulness-Based Cognitive Behavioral Interventions to Enhance Academic Buoyancy: A Meta-Analytic Study

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Abstract: This study explores the effectiveness of mindfulness-based cognitive behavioral interventions in developing academic buoyancy among students, defined as their capacity to overcome daily academic challenges such as stress, time pressure, and minor failures. Using a meta-analytic approach, the research synthesizes findings from 15 independent studies involving 4,509 participants across diverse educational contexts, including the United States, Canada, Iran, and the United Kingdom. The random effects model revealed a significant positive correlation between mindfulness interventions and academic buoyancy, with a high effect size. The findings underscore the potential of mindfulness integrated with cognitive behavioral therapy to enhance students' resilience by reducing stress and improving executive functions such as emotional regulation, attention, and decision-making. Despite its demonstrated effectiveness, heterogeneity in study designs, intervention durations, and measurement tools suggests the need for further research to refine and standardize these interventions. This study provides evidence-based insights for educators and counselors aiming to integrate mindfulness practices into academic settings, contributing to the broader discourse on mental health and educational resilience.

INTRODUCTION

Student mental health has emerged as a critical global issue. Various studies have demonstrated that good mental health serves as an essential foundation for academic success. According to the World Health Organization (WHO), one in seven adolescents worldwide experiences mental health disorders, such as anxiety, depression, and stress, which directly impact their ability to learn and develop optimally. In response, many countries have implemented school-based initiatives to promote mental health, including prevention programs, early interventions, and psychosocial support for students (Ulfah, 2023; Karnadi & Rismayati, 2020).

The urgency of addressing students' mental health is particularly significant in the context of modern educational challenges. In Indonesia, the Ministry of Health has reported a growing prevalence of mental health issues among adolescents, primarily driven by academic pressure. Despite this, efforts to support students' mental health are often hindered by limited access to professional counseling services and persistent social stigma surrounding mental health

disorders (Putri & Hidayat, 2022). Therefore, an integrated and systematic approach to mental health in educational settings is crucial to improving students' quality of life and preparing them to face global challenges with resilience and adaptability.

The psychological challenges faced by Indonesian students in daily academic processes are concerning. For instance, approximately 85% of students experience mild anxiety (Suryani, 2021). Similarly, a study of 500 students in West Java Province revealed that 55% of adolescents suffer from internal academic stress, while data from 2019 indicated a dropout rate of 0.8%, largely attributed to students' inability to cope with academic challenges (Gibbons, 2015; El-Khodari et al., 2023; Lillyman & Bennett, 2014).

Academic challenges manifest in various ways, including poor grades, heightened anxiety, diminished self-confidence, and lack of motivation to learn. Students facing such challenges often exhibit low academic engagement and suboptimal performance in completing academic tasks (Martin-Cuellar et al., 2021; Smith, 2020). Addressing these issues requires innovative strategies that not only focus on mental health but also enhance students' academic resilience.

One promising approach is mindfulness, which is defined as the intentional and non-judgmental awareness of present experiences (Arpaci & Gundogan, 2022; Bartlett et al., 2021). Although initially developed for clinical contexts, mindfulness-based interventions have increasingly been applied in professional and educational settings over the past decade (Lomas et al., 2019). Research shows that mindfulness can significantly improve self-awareness, emotional regulation, and interpersonal relationships, making it a valuable tool for enhancing students' academic resilience.

The importance of mindfulness in education is supported by the growing body of literature on the topic. Since 2009, publications on mindfulness have increased significantly, with a notable surge in 2012. However, most studies focus on general theoretical perspectives or interventions in postsecondary and elementary settings, with limited attention given to middle school and college environments (Greenberg & Harris, 2012; Schonert-Reichl et al., 2015). Furthermore, the role of school counselors in implementing mindfulness-based interventions remains underexplored, despite its potential to address daily academic challenges.

While existing studies have examined the benefits of Cognitive Behavioral Therapy (CBT) and mindfulness in reducing anxiety and improving well-being, research on the integration of mindfulness within CBT frameworks to enhance academic buoyancy is still limited. Academic buoyancy, which refers to students' ability to cope with everyday academic challenges, has been largely overlooked in studies that focus on broader academic resilience or stress reduction strategies.

To address this gap, the present study aims to conduct a systematic review and meta-analysis linking mindfulness, Cognitive Behavioral Therapy (CBT), and academic buoyancy. It seeks to highlight the potential of mindfulness-based interventions not only as strategies for improving general well-being but also as effective approaches to enhance students' ability to manage daily academic pressures. Additionally, this study aims to identify evidence-based practices that educators and counselors can adopt to improve students' academic performance by fostering academic buoyancy. By exploring these dimensions, the study aspires to provide novel insights and contribute to the development of targeted intervention strategies in educational counseling. Furthermore, it emphasizes the need for more scientific inquiry into the integration of mindfulness within

CBT frameworks to enhance students' academic resilience and adaptability in daily academic contexts.

METHOD

This study employs the meta-analysis method, a statistical approach used to aggregate the results of multiple independent studies to derive quantitative conclusions. The research involved 4,509 participants, cumulatively obtained from 15 independent studies. These studies were selected using a non-probability sampling approach, with participants representing diverse educational backgrounds and geographical contexts, including the United States, the United Kingdom, Iran, and Canada.

The quality of the studies included in the meta-analysis was assessed based on established standards, such as the validity of measurement instruments, research design, and sample size (Hayati & Sinha, 2024). The quality of previous studies is a critical factor influencing the overall outcomes of a meta-analysis. To address potential variations between studies, a random-effects model was utilized, accounting for differences in sampling methods, intervention durations, and measurement tools. This approach aims to produce more representative and in-depth findings regarding the effectiveness of mindfulness interventions in enhancing students' academic resilience.

While the meta-analysis method offers a comprehensive approach to synthesizing research findings, several methodological limitations must be considered:

1. Study Heterogeneity: The results indicate a heterogeneity level of 32%, suggesting moderate variation across studies in terms of design, measurement tools, intervention duration, and participant characteristics.
2. Variations in Measurement Instruments: Different studies employed varied instruments to assess the effectiveness of mindfulness, potentially impacting the overall reliability and validity of the findings.
3. Sampling Methods: Many studies relied on non-probability sampling techniques, such as convenience sampling or purposive sampling, which may introduce selection bias and limit the generalizability of the results to broader populations.
4. Intervention Duration: The duration of mindfulness interventions varied across the analyzed studies, ranging from several weeks to several months. These differences may influence the reported effect sizes and overall conclusions.

Procedures and Measurements

This study focuses on international journal articles investigating mindfulness-based interventions to enhance adolescent academic performance, specifically selecting journals published within the last five years. Data collection was conducted using three electronic databases, including ResearchGate and ScienceDirect, with the keywords "mindfulness integrated cognitive behavior therapy for academics." The initial search yielded 4,700 articles and books related to the keywords. Researchers then refined the results by applying a publication year filter from 2010 to 2022, which expanded the results to 15,900 entries. Subsequent filtering was performed to focus on studies utilizing mindfulness-based interventions with measurable outcomes in academic contexts, narrowing the selection to 1,200 research articles. These articles were further reviewed based on specific criteria: study characteristics, including year of publication, procedures, research design, and type of control; participant characteristics, such as sample size and respondents' professions; and intervention characteristics, including the type and duration of the intervention. This rigorous

selection process ensures that only high-quality, relevant studies are included, providing a robust basis for analyzing the effectiveness of mindfulness-based interventions in improving academic outcomes among adolescents.

Table 1. Estimated Heterogeneity of Residuals.

	Estimation	95% Confidence Interval	
		Lower	Top
sq	59,146 people	31,667 people	147,297 people
saya	7,691 years	5,627 people	12.137
saya² (%)	99,958 years	99,922 years	99.983
H²	2400,697 years	1285.798	5977.220

This study analyzed the effect size by calculating the mean (M), standard deviation (SD), and sample size (N) for each group's post-intervention results using the JASP application version 0.16.4.0. To assess heterogeneity, the I^2 statistic was applied, with inconsistency values categorized into three levels: low ($I^2 \leq 25\%$), medium ($I^2 \approx 50\%$), and high ($I^2 \geq 75\%$) (Card, 2012). The I^2 value in this study was 99%, indicating a high level of heterogeneity. Consequently, the researchers recommend using the random-effects model to account for this variation in effect size estimation.
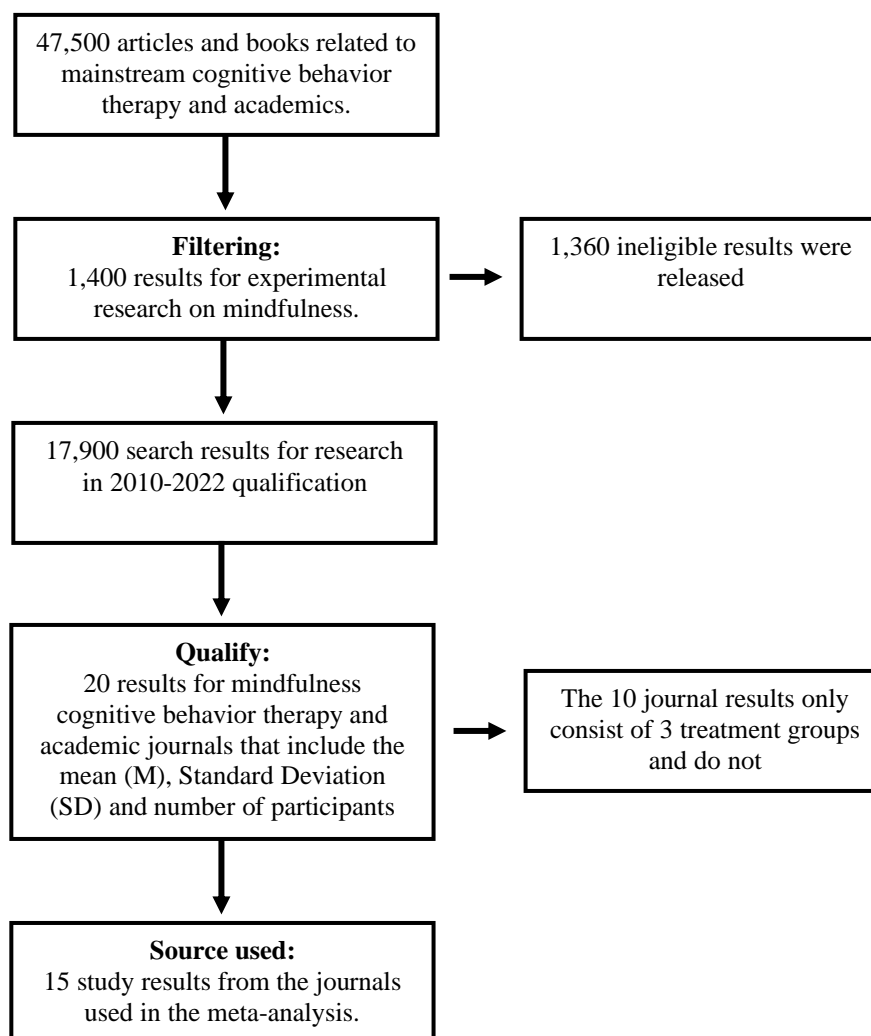

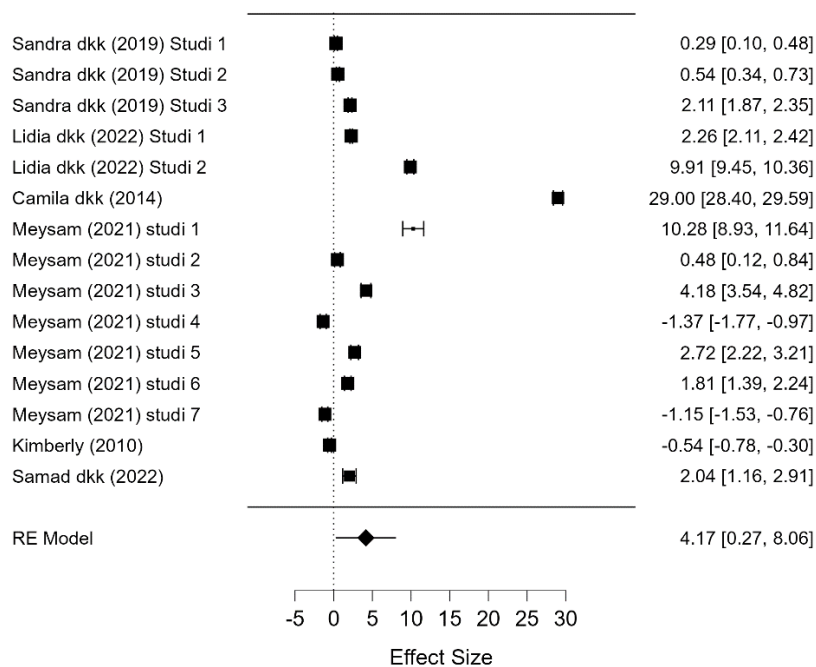**Figure 1.** Journal Identification Flow Scheme.
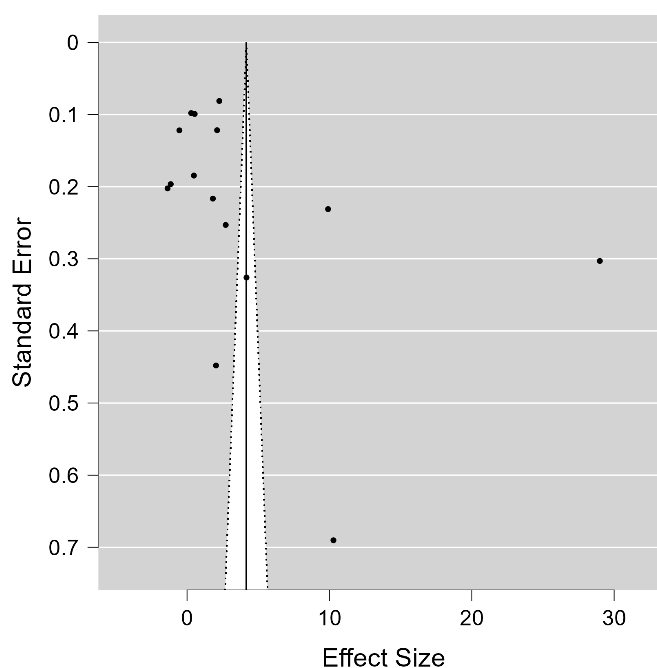
Figure 2. Forest Plot.

Figure 3. Corong Plot.

Based on Figure 2, the forest plot revealed that the effect sizes of the analyzed studies ranged from -1.37 to 29.00, indicating considerable variability in the observed outcomes. Figure 3 illustrates a funnel plot that appears asymmetrical, with some data points positioned far to the right of the X-axis, reflecting large effect sizes. This asymmetry may suggest the presence of publication bias, where studies with significant or large effects are more likely to be published. Points with high standard errors, located at the top of the plot, correspond to studies with smaller sample sizes, while points with low standard

errors, situated at the bottom, represent studies with larger sample sizes. The uneven distribution of points on either side of the central vertical line further indicates heterogeneity among the studies. This heterogeneity may stem from differences in methodology, population characteristics, or intervention durations across the included studies.

RESULT AND DISCUSSION

This study analyzed data from 15 journal articles involving a total of 4,509 respondents to evaluate the effectiveness of mindfulness interventions in enhancing academic achievement and academic buoyancy in classroom settings. These studies included participants from diverse geographical contexts, such as the United States, the United Kingdom, Iran, and Canada. The analysis revealed an inconsistency value of 32%, indicating moderate heterogeneity among the included studies. To address this variability, the researchers employed Hedges' g (SMD) within a random-effects model, which accounts for differences across studies, such as variations in measurement tools and types of mindfulness interventions.

The calculated effect size was 0.62 (95% CI: 0.43–0.80), which falls within the medium category based on Cohen's classification, where small effects are defined as $g \leq 0.2$, medium effects as $g \pm 0.5$, and large effects as $g \geq 0.8$. These findings suggest that mindfulness-based interventions exert a moderate impact on improving students' academic resilience. The observed effectiveness can be attributed to several psychological and cognitive mechanisms. For instance, mindfulness is known to reduce stress and enhance focus, as supported by Kabat-Zinn's Mindfulness-Based Stress Reduction (MBSR) theory. According to this theory, mindfulness cultivates present-moment awareness, thereby reducing reactivity to stress—a common challenge in academic contexts characterized by time pressures, heavy workloads, and high expectations that can impair concentration and productivity.

In addition to stress reduction, mindfulness is also associated with enhanced executive functions, including emotional regulation, attention control, and decision-making (Tang et al., 2015). These cognitive functions are essential for managing everyday academic challenges, thereby fostering academic buoyancy. Schonert-Reichl et al. (2015) demonstrated that mindfulness training significantly improves sustained attention and reduces emotional disturbances among students, resulting in better academic performance.

However, the moderate effectiveness observed in this study may also be influenced by external factors such as the duration of mindfulness training, the quality of intervention implementation, and the cultural context of the participants. Variations in the measurement instruments and types of interventions used across the studies analyzed could further contribute to the overall results. Addressing these factors requires more focused research to refine intervention strategies and maximize their impact.

In summary, this study highlights the significant potential of mindfulness-based Cognitive Behavioral Therapy (CBT) in supporting students' academic resilience. However, its current impact remains moderate, underscoring the need for a more structured, evidence-based approach to integrating mindfulness into educational practices. A systematic and culturally sensitive implementation of mindfulness strategies in schools could amplify its effectiveness in promoting academic resilience. Table 1 below presents a model-based random-effects analysis of the results from the studies included in the meta-analysis.

Table 2. Effect Size Analysis of Study Results.

No	Study Name	Level	N	Effect Size			
				g	SEg	g lower	g upper
1	Sandra et al (2019) Study 1	Student	210	0.2882	0.098	0.10	0.48
2	Sandra et al (2019) Study 2	Student	210	0.5360	0.099	0.34	0.73
3	Sandra et al (2019) Study 3	Student	210	2.1108	0.122	1.87	2.35
4	Lidia et al (2022) Study 1	Senior High School	497	2.2647	0.081	2.11	2.42
5	Lidia et al (2022) Study 2	Senior High School	2311	9.9055	0.231	9.45	10.36
6	Camila et al (2014)	Student	60	28.9953	0.303	28.40	29.59
7	Meysam (2021) Study 1	Junior High School	60	10.2825	0.690	8.93	11.64
8	Meysam (2021) Study 2	Junior High School	60	0.4802	0.185	0.12	0.84
9	Meysam (2021) Study 3	Junior High School	60	4.1770	0.326	3.54	4.82
10	Meysam (2021) Study 4	Junior High School	60	-1.3697	0.203	-1.77	-0.97
11	Meysam (2021) Study 5	Junior High School	60	2.7167	0.253	2.22	3.21
12	Meysam (2021) Study 6	Junior High School	60	1.8134	0.217	1.39	2.24
13	Meysam (2021) Study 7	Junior High School	60	-1.1460	0.197	-1.53	-0.76
14	Kimberly (2010)	Elementary School	139	-0.5377	0.122	-0.78	-0.30
15	Samad et al (2022)	Student	15	2.0350	0.445	1.16	2.91

Most effect sizes demonstrate statistical significance with narrow confidence intervals, indicating that the tested variables exert an accurate and consistent influence within the research context. This reliability underscores the robustness of the findings, highlighting the practical relevance of the tested interventions in improving academic resilience and performance. Additionally, the narrow confidence intervals suggest reduced variability across studies, further supporting the generalizability of the results.

Table 3. Fixed and Random Effects.

	Q	df	Matter
Omnibus Test of Model Coefficients	4,395 people	1	0.036 days
Residue Heterogeneity Test	10826814	14	< .001

The analysis of the results revealed that the 15 studies included in this meta-analysis exhibited significant heterogeneity ($Q = 826.814$, $p < 0.001$), indicating substantial variability in effect sizes across the studies. Consequently, a Random Effects model was deemed more appropriate for estimating the average effect size of the analyzed studies, as it accounts for variations both within and between studies.

Furthermore, the findings suggest potential avenues for further exploration of moderator variables that may influence the relationship between self-control and academic achievement in students. Investigating these moderators could provide deeper insights into how specific factors, such as intervention duration, participant characteristics, or cultural contexts, impact the effectiveness of mindfulness-based interventions in enhancing academic outcomes. This highlights the need for future research to focus on these variables to better understand their role in shaping intervention outcomes and optimizing strategies for diverse educational settings.

The Egger's test ($p > 0.05$) confirmed that the funnel plot was symmetrical, indicating the absence of significant publication bias in the meta-analysis. This result suggests that the studies included in the analysis were not disproportionately influenced by the selective publication of studies with significant or large effects, thereby enhancing the reliability and validity of the findings.

Table 4. Coefficient.

	Estimation	Standard Error	From	Matter	95% Confidence Interval	
					Lower	Top
Tapping	4.166	1987	year 209	0.036 days	0.271	8060

Table 5. File Drawer Analysis.

	Security Fail N	Important Targets	Observed significance
Rose	19376.000	0,050	< .001

The range of values from 0.271 to 8.060 indicates that, at a 95% confidence level, the actual coefficient value is expected to fall within this interval. Based on the results of the File Drawer Analysis, where K = 33, the calculation 5K+10=5 (33) + 10=175 was used to determine the threshold. The obtained Fail-safe N value was 19,376, significantly exceeding the threshold of 5K+10. This confirms that there is no publication bias in the meta-analytic research, ensuring the reliability of the findings.

The analysis, which included 15 research articles (Table 1), employed a random-effects model to examine the effect of mindfulness interventions on academic achievement. The random-effects analysis revealed a significant positive correlation between mindfulness and academic achievement (z = 2.096, p < 0.001; 95% CI [0.271;8.060], with the effect size categorized as high (rg = 4.166). These findings demonstrate that mindfulness-based interventions significantly improve academic outcomes in adolescents, as mindfulness fosters heightened awareness and cognitive integration without evaluative judgment (Gelso & Williams, 2021).

The variation in the types of mindfulness interventions analyzed suggests the need for further research to standardize intervention protocols and measurement scales. It is also important to note that resilience, as a psychological construct, can only be accurately measured when individuals face stress or trauma. Studies involving respondents without significant stress or trauma may yield less impactful results.

Additionally, some of the studies included in this meta-analysis had small sample sizes, which can reduce the generalizability and statistical power of findings, increasing the likelihood of bias (Wilson et al., 2015; Zapolski et al., 2019).

The results highlight the significant impact of mindfulness on improving academic achievement, as indicated by the high heterogeneity and correlation of effect sizes. However, inconsistencies in measurement tools and variations in intervention designs contributed to heterogeneity across studies (Chung et al., 2024). Some studies also reported participant attrition, reducing the total number of respondents and potentially impacting outcomes.

This study identified several limitations that should inform future research. The variety of mindfulness-based interventions and the inclusion of respondents from different educational levels—ranging from elementary school to university—introduced variability in the findings. Additionally, the use of diverse measurement instruments complicated cross-study comparisons. Future research should address these limitations by standardizing mindfulness interventions and examining their effects across consistent educational and demographic contexts.

Furthermore, exploring other dimensions of well-being, including physical health, can provide a more holistic understanding of mindfulness interventions. Detailed measures of mindfulness practice, such as duration, style, and quality, should also be incorporated to assess intervention effectiveness more comprehensively.

Finally, future studies should consider the impact of stress or trauma on respondents, as academic outcomes tend to be more pronounced in individuals with higher stress levels. By addressing these areas, future research can offer greater clarity on the role of mindfulness in enhancing academic performance and resilience, ultimately contributing to the development of more targeted and effective interventions in educational settings.

CONCLUSION

This study demonstrates the effectiveness of mindfulness-based cognitive behavioral interventions in enhancing academic buoyancy, defined as students' ability to navigate daily academic challenges such as stress, time pressure, and minor setbacks. The meta-analytic approach, synthesizing data from 15 studies involving 4,509 participants across diverse educational contexts, revealed a significant positive correlation between mindfulness interventions and academic buoyancy, with a high effect size. These findings highlight the potential of integrating mindfulness with cognitive behavioral therapy to improve resilience by reducing stress and enhancing executive functions, including emotional regulation, attention, and decision-making. However, the heterogeneity observed in study designs, intervention durations, and measurement tools underscores the need for further research to refine and standardize mindfulness-based interventions. Addressing these methodological inconsistencies will provide a stronger foundation for the broader implementation of mindfulness practices in academic settings. This study offers evidence-based insights for educators and counselors, contributing to the development of targeted strategies to support mental health and resilience in educational contexts.

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