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Enhancing Academic Buoyancy and Psychological Flow in Higher Education: The Effect of Mindfulness-Based Training

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Abstract

This study examined the effectiveness of a mindfulness-based training program on academic buoyancy and psychological flow among university students. Using a quasi-experimental design, 60 male undergraduate students were assigned to experimental (n=30) and control (n=30) groups. The experimental group participated in a 15-week mindfulness training program, with assessments conducted at pre-test, post-test, and follow-up using the Academic Buoyancy Scale and Psychological Flow Scale. Results showed significant improvements in the experimental group across all dimensions of academic buoyancy (partial η^2 = .864) and psychological flow (partial η^2 = .930), with effects maintained through follow-up. The intervention demonstrated particularly strong effects on confidence (partial η^2 = .787) and intrinsic reward (partial η^2 = .907). The control group showed no significant changes. These findings suggest that structured mindfulness training can effectively enhance students' capacity to manage academic challenges and achieve optimal learning states, offering promising implications for student support services in higher education settings.

Keywords: *mindfulness intervention, academic buoyancy, psychological flow, university students*

1. Introduction

University students face numerous challenges, including high levels of stress, anxiety, and mental health issues, which can significantly impact their academic performance and overall well-being (Hu et al., 2024; Putwain et al., 2023). Transitioning to university life requires adaptation to new academic environments, and factors like self-efficacy, intrinsic motivation, and social support play crucial roles in fostering psychological flow and academic adjustment (Kritikou & Giovazolias, 2022). Academic buoyancy, which is the ability to cope with academic adversities is positively correlated with self-efficacy, engagement levels and psychological well-being (Othman, 2022; Martin & Marsh, 2008). University environments are stressful and detrimental to the mental health of learners (Conway, 2019; Urbina-Garcia, 2020). Students' attitude and character are very important in academic buoyancy since other elements such as test anxiety mental health challenges influencing academic buoyancy (Eslami & Hooshmandi, 2023; Suharsono & Fatimah, 2024; Putwain et al., 2012).

Mindfulness Based Interventions (MBIs) have been adopted in higher education settings, particularly due to their demonstrated effectiveness in addressing student mental health and engagement (Dawson et al., 2019; González-Martín et al., 2023). MBIs significantly reduce symptoms of stress, anxiety, and depression among university students, with effect sizes ranging from small to moderate (Chiodelli et al., 2020; Ritvo et al., 2021). Studies show that additive benefits from these strategies are not just a stress relief; they also show sustained improvements in distress and mindfulness levels up to three months after the interventions (Dawson et al., 2019; Galante et al., 2018).

Apart from the positive impacts on mental health as a primary area, mindfulness interventions have become strong learning practices that alter students' attitude to learning (Ergas & Hadar ,2021). Mindfulness studies show that mindfulness practices increase students' self-regulation abilities and academic engagement during their university experience (Hammill et al., 2023; Schwind et al., 2017). While the implementation of these programs generally lasts 1–3 months, incorporating various features as video modules, peer discussions, and guided meditations (Ritvo et al., 2021; Serrão et al., 2022), researchers recognize the lack of more rigorous research to understand how MBIs impact education outcomes (Daya & Hearn, 2018)

Academic buoyancy is an important ability for university students to deal effectively and constructively with everyday academic challenges, such as poor grades, exam pressure, and routine setbacks (Martin & Marsh, 2008). This adaptive response mechanism is strongly influenced by various individual and environmental factors, including self-efficacy, intrinsic motivation, and supportive learning environments (Aydın & Michou, 2019; Kritikou & Giovazolias, 2022). Academic buoyancy influences the relationship between growth mindset and positive educational outcomes, including higher academic performance, engagement, and psychological well-being (Eslami & Hooshmand, 2023; Suharsono & Fatimah, 2024). Moreover, academic buoyancy has reciprocal relation with psychological risk factors correlated with students' overall well-being (Martin et al., 2013; Othman, 2022; Abdellatif, 2022).

Higher education has recently developed an increasingly psychological flow, understood as a state of total absorption and deep engagement in academic activities (Abdellatif, 2023; Mandhana & Caruso, 2023; Peifer et al., 2022). Flow experiences positively impact academic achievement by reducing self-handicapping behaviors and increasing engagement (Adil et al., 2019; Nascimento et al., 2024). Furthermore, flow mediates academic psychological capital and perceived stress, enhancing student engagement, managing pressures, and promoting academic intrinsic motivation, ultimately supporting academic success and psychological well-being (Adil et al., 2020).

Interventions to improve both academic buoyancy and psychological flow exist for university students, research shows. Effective interventions include mindfulness-based programs, online Acceptance and Commitment Therapy, and positive psychology interventions (Grégoire et al., 2018; Räsänen et al., 2016; Vorontsova-Wenger et al., 2021). Digital interventions and structured programs such as SKY Campus Happiness are effective in improving psychological well-being and reducing depression, stress and mental health (Davies et al., 2014; Ferrari et al., 2022; Seppälä et al., 2020). As a growing body of evidence, it is important to develop comprehensive intervention for supporting students' buoyancy and psychological flow in higher education settings.

Despite mindfulness benefits for mental health, stress reduction, and academic performance (Al-Zoubi, 2024; Breedvelt et al., 2019; Dawson et al., 2019; Vorontsova-Wenger et al., 2021), specific research of academic buoyancy and flow remains underdeveloped. While recent studies show mindfulness's relationship with academic buoyancy and flow (Satıcı et al., 2024), longitudinal research is needed to understand its specific influence on psychological flow among diverse university student populations (Alomari, 2023; Bóo et al., 2019; Egbaria, 2024; Karadjova-Kozhuharova & Baker, 2023; Medlicott et al.).

This study aims to evaluate the effectiveness of mindfulness-based training programs on academic buoyancy and psychological flow among university students using a pre-test, post-test, and follow-up controlled group design. The research employs a rigorous experimental methodology with equivalent experimental and control groups to assess the intervention's impact.

2. Method

2.1 Participants

The study employed a quasi-experimental design with experimental and control groups to investigate the impact of a mindfulness-based training program on academic buoyancy and psychological flow. The sample consisted of 60 male undergraduate students (age range: 21-24 years, $M = 21.92$, $SD = 0.87$) from the Faculty of Education at Al-Azhar University, Egypt, during the 2023-2024 academic year. The experimental ($n=30$) and control ($n=30$) groups were non randomly assigned.

2.2 Measures

The Academic Buoyancy Scale (ABS) was developed in Arabic through a rigorous process, including validation by five expert reviewers. The scale was initially composed of 40 items, refined to 29 items following exploratory factor analysis (EFA). The final instrument uses a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) and measures four dimensions: Confidence, Commitment, Composure, and Control. The translation process ensured cultural and linguistic appropriateness while maintaining the scale's conceptual equivalence.

The ABS demonstrated strong psychometric properties across multiple reliability and validity indicators. The scale showed excellent internal consistency with Cronbach's alpha ($\alpha = 0.936$), McDonald's omega ($\omega = 0.937$), and Guttman's lambda-2 ($\lambda 2 = 0.938$). Factor analysis supported the scale's construct validity, with EFA revealing a four-factor structure (KMO = 0.968, Bartlett's $p < .001$) and CFA confirming good model fit (CFI = 0.948, TLI = 0.943, RMSEA = 0.040, GFI = 0.930). Convergent validity was supported by adequate composite reliability (CR = 0.923) and average variance extracted (AVE = 0.750). Moreover, the subscales demonstrated good reliability: Composure ($\alpha = 0.887$, $\omega = 0.887$), Commitment ($\alpha = 0.869$, $\omega = 0.870$), Confidence ($\alpha = 0.815$, $\omega = 0.814$), and Control ($\alpha = 0.677$, $\omega = 0.677$). Concurrent validity was established through a strong positive correlation ($r = 0.82$, $p < .01$) with Mohamed et al.'s (2024) Academic Buoyancy Scale validated with Egyptian university students. Item-total correlations ranged from 0.492 to 0.662, indicating satisfactory internal consistency at the item level.

The Psychological Flow Scale (PFS; Norsworthy et al., 2023) was used to measure flow experience. The 9-item scale assesses three core dimensions: Absorption, Intrinsic Reward, and Effortless Control. Confirmatory factor analysis supported the three-factor structure with strong fit indices (CFI = .970, RMSEA = .062, GFI = .973, NFI = .961). The scale demonstrated robust reliability with McDonald's $\omega = .846$, Cronbach's $\alpha = .845$, and Guttman's $\lambda 2 = .847$. The subscales showed satisfactory internal consistency (α ranging from .707 to .754). Construct validity was supported by

(AVE = .708) and (CR = .879). Inter-item correlations ranged from r = .201 to r = .652, indicating good internal consistency. Concurrent validity was established through a strong positive correlation ($r = 0.76$, $p < .01$) with Ashry et al.'s (2025) Psychological Flow Scale validated with Egyptian teachers.

After standard cross-cultural adaptation procedures, the PFS underwent a rigorous translation process. The scale was translated by three bilingual specialists from English to Arabic. The content validity, cultural appropriateness and linguistic accuracy of the items was reviewed by five subject matter experts. The experts evaluated the Arabic version for its clarity, relevance, and cultural equivalence, ensuring it remained consistent with the original scale's conceptual and measurement integrity

2.3 Procedure

The program was started off by obtaining necessary approvals from the Faculty of Education in Dakahlia, Al-Azhar University. Students with high levels of academic buoyancy, and psychological flow as well as students from other academic years were initially screened out.

A total of 60 eligible participants were selected and randomly assigned to two groups: Two groups comprised 30 students in an experimental group and a control group. Before administering the intervention, the academic buoyancy scale and psychological flow scale were applied to both groups to establish baseline measures as well as group homogeneity. There were no significant differences between the groups on either measure before the intervention started, confirmed by statistical analysis.

During the first semester of the 2023-2024 academic year, the experimental group participated in 15 sessions of a mindfulness-based training program, over 15 weeks. Each session lasted two hours and was structured around the five core components of mindfulness: observation, description, acting with awareness, non-judgment of inner experience, and non-reactivity to inner experience. No intervention was provided to the control group.

The training program was structured along with a progressive systematic progression starting with basic introductory sessions aimed at building a foundational knowledge about mindfulness components. Sessions that followed addressed how to apply certain mindfulness skills and gave time for practice in subsequent sessions. The program included regular review sessions to reinforce learning and ensure skill retention. The final sessions integrated all components and assessed overall progress. After completing the training program both the experimental and control groups were post tested using the same academic buoyancy and psychological flow scales that were administered at baseline

2.4 Data Analysis

The study used SPSS version 27 for data analysis, evaluating the effectiveness of a mindfulness-based training program through descriptive statistics, mixed-design ANOVA, partial eta-squared, post-hoc analyses, and follow-up comparisons to assess changes in academic buoyancy and psychological flow across time points.

3. Results

The effectiveness of the mindfulness-based training program was evaluated through analyses of both academic buoyancy and psychological flow measures across three time points. Table 1 presents descriptive statistics and repeated measures analysis for all variables, showing significant differences between the experimental and control groups.

Table 1: Descriptive Statistics and Repeated Measures Analysis of ABS and PES

Variables	Group	Pretest		Posttest		Follow-Up		*F* value	partial η^2
		M	*SD*	*M*	*SD*	*M*	*SD*		
Confidence	Exper.	18.20	4.53	28.18	2.28	28.78	3.19	105.606**	.787
	Control	18.17	5.04	17.90	4.34	18.10	4.36	.388	.013
Commitment	Exper.	24.93	4.40	39.20	3.29	38.93	3.46	72.147**	.717
	Control	25.40	4.41	25.13	5.34	25.13	5.40	.026	.001
Composure	Exper.	22.96	4.67	34.63	3.98	34.03	3.09	60.801**	.681
	Control	23.23	4.64	23.53	5.61	23.50	5.28	.040	.001
Control	Exper.	12.30	2.72	14.37	2.67	14.20	2.29	3.555*	.111
	Control	11.80	3.14	10.00	3.33	10.07	3.07	2.851	.091
Total ABS	Exper.	78.40	9.90	116.76	9.53	115.93	8.89	181.595**	.864
	Control	78.60	7.87	76.56	7.41	76.80	7.33	.487	.017
Absorption	Exper.	10.03	2.11	15.40	2.64	15.90	2.44	210.057**	.881
	Control	9.83	2.05	10.00	2.25	10.20	2.50	1.078	.038
Intrinsic Reward	Exper.	10.93	1.72	16.06	2.32	15.83	1.80	276.483**	.907
	Control	10.66	1.77	10.76	2.09	10.90	2.00	.449	.016
Effortless Control	Exper.	10.07	2.16	15.46	2.34	15.17	1.74	215.315**	.883
	Control	10.23	2.11	10.27	2.32	10.56	2.85	.825	.028
Total PFS	Exper.	31.03	3.16	46.93	4.26	46.90	2.99	379.586**	.930
	Control	30.73	3.00	31.03	4.27	31.66	5.45	1.684	.056

For academic buoyancy, the experimental group demonstrated substantial improvements across all dimensions. The total Academic Buoyancy Scale (ABS) scores showed a significant main effect ($F = 181.595$, $p < .01$, partial $\eta^2 = .864$), indicating that the intervention had a strong impact on overall academic buoyancy. Among the individual dimensions, Confidence showed the largest effect size (partial $\eta^2 = .787$), followed by Commitment (partial $\eta^2 = .717$) and Composure (partial $\eta^2 = .681$). The Control dimension, while still significant, showed a smaller effect size (partial $\eta^2 = .111$). In contrast, the control group showed no significant changes across any of the academic buoyancy dimensions throughout the study period.

Table 2: Mean Differences in ABS and PES for Experimental Group Across Measurement Points

Variables	Group	Mean Diff (Pre-Post)	Mean Diff (Post-Follow-Up)	Mean Diff (Pre-Follow-Up)
Confidence	Exper.	-10.367**	-.200	-10.567**
Commitment	Exper.	-14.267**	.267	-14.000**
Composure	Exper.	-11.667**	.600	-11.067**
Control	Exper.	-2.067**	.167	-1.900*
Total ABS	Exper.	-38.367**	.833	37.533**
Absorption	Exper.	-5.367**	-.500**	5.867**
Intrinsic Reward	Exper.	-5.133**	.233	-4.900**
Effortless Control	Exper.	-5.400**	.300	-5.100**
Total PFS	Exper.	-15.900**	.033**	-15.867**

Examining the temporal patterns of change (Table 2), the experimental group showed significant improvements from pre-test to post-test across all dimensions of academic buoyancy. The largest mean difference was observed in Commitment (-14.267, $p < .01$), followed by Composure (-11.667, $p < .01$) and Confidence (-10.367, $p < .01$). These improvements were largely maintained during the follow-up period, with only minimal and non-significant changes between post-test and follow-up measurements.

For psychological flow, the results revealed even more pronounced effects of the intervention. The total Psychological Flow Scale (PFS) scores showed the largest effect size among all measured variables ($F = 379.586$, $p < .01$, partial $\eta^2 = .930$). All three components of flow demonstrated substantial improvements, with Intrinsic Reward showing the highest effect size (partial $\eta^2 = .907$), followed closely by Effortless Control (partial $\eta^2 = .883$) and Absorption (partial $\eta^2 = .881$).

Table 3 Comparative Mean Differences of Experimental Group Across Measurement Points

Variables	Pre-test Mean Diff (Exper-Control)	Post-test Mean Diff (Exper-Control)	Follow-up test Mean Diff (Exper-Control)
Confidence	0.033	10.667**	10.667**
Commitment	-.467	14.067**	.13.800**
Composure	-.267	11.100**	10.533**
Control	.500	4.367**	4.133**
Total ABS	-.200	40.200**	39.133**
Absorption	.200	5.400**	5.700**
Intrinsic Reward	.267	5.300**	4.933**
Effortless Control	-.167	5.200**	4.600**
Total PFS	.300	15.900**	15.233**

The comparative analysis between groups (Table 3) further supported the effectiveness of the intervention. At pre-test, there were no significant differences between the experimental and control groups across any measures, confirming initial group equivalence. However, at both post-test and follow-up, the experimental group showed significantly higher scores across all dimensions of both academic buoyancy and psychological flow. The largest between-group differences were observed in the total ABS scores (post-test difference = 40.200, $p < .01$) and total PFS scores (post-test difference = 15.900, $p < .01$).

These results collectively demonstrate that the mindfulness-based training program was highly effective in enhancing both academic buoyancy and psychological flow among university students, with improvements maintained through the follow-up period. The consistency of effects across multiple dimensions and measures, coupled with the large effect sizes, suggests that the intervention had a robust and comprehensive impact on students' academic psychological resources.

4. Discussion

This study investigated the potential effectiveness of a mindfulness-based training program in academic buoyancy and psychological flow. Results indicate robust positive effects of the intervention along a wide range of both constructs dimensions, with effects sustained through follow up. These findings extend the understanding of how specific mindful aspects support students' academic buoyancy and optimal learning experiences.

The substantial improvements in academic buoyancy align with previous studies find a positive relationship between mindfulness interventions and students' abilities to cope with academic challenges (Al-Sherif, 2024; Dawson et al., 2019; Vorontsova-Wenger et al., 2021). In particular, large size effects were observed for academic buoyancy on the confidence and commitment dimensions (partial $\eta^2 = .787$ and $.717$ respectively). Previous research by Kritikou and Giovazolias (2022) confirming correlation between academic adjustment and self-efficacy, mindfulness training significantly enhances students' self-efficacy and commitment to academic success.

Corresponding to established literature on the effects of mindfulness interventions on reducing stress and anxiety in university students, the composure dimension greatly improved (partial η^2 =

.681) (Chiodelli et al., 2020; Elbably & Nemt-allah, 2024; Ritvo et al., 2021). The improvement in emotional regulation capacity is crucial due to the growing mental health issues faced by university students (Hu et al., 2024; Putwain et al., 2023). The smaller but still significant improvement in the control dimension (partial η^2 = .111) suggests that while mindfulness training can improve academic control, some additional targeted interventions, perhaps longer practice periods, will be needed to show stronger effects.

The intervention's impact on psychological flow was pronounced, with large effect sizes across all three components: These factors included: absorption (partial η^2 = .881), intrinsic reward (partial η^2 = .907), and effortless control (partial η^2 = .883). These findings build on previous educational contexts, showing that mindfulness training can systematically increase students' flow experience capacity (Abdellatif, 2023; Mandhana & Caruso, 2023). Furthermore, academic buoyancy can be significantly enhanced through targeted training interventions (Khalifa & Ahmed, 2024). The particularly strong effect on intrinsic reward supports the finding of recent meta-analyses linking mindfulness to greater intrinsic motivation and suggests that mindfulness practices help students develop an intrinsically motivated approach to their studies (Li et al., 2023).

The importance of maintaining improvements through the follow-up period, suggesting that mindfulness training's benefits may be sustainable over time, providing a significant answer to the literature's key questions about the effectiveness of increasing mindfulness interventions (Dawson et al., 2019; Galante et al., 2018). Mindfulness is responsible for consistent improvement in academic buoyancy and psychological flow, in turn the active evolution of enduring psychological resources for academic success.

The study suggests that mindfulness training can lead to improvements in students' academic experience across multiple dimensions. These improvements are achieved through multiple complementary mechanisms, which are consistent with the theoretical hypothesis that mindfulness enhances attention and emotion regulation (Ergas & Hadar, 2021; Hammill et al., 2023). The convergence of academic buoyancy and psychological flow suggests a potential link between these constructs, with improvements in one area being accompanied by improvements in the other.

The study results are validated by revealing no changes in all measures in the control group, indicating that the improvements observed in the experimental group are not due to natural maturation or testing effects. This is particularly relevant due to the quasi-experimental nature of the study design, addressing previous methodological criticisms about the need for more rigorous evaluation of mindfulness interventions in educational settings (Daya & Hearn, 2018).

The findings yield important practical and educational implications. It suggests that university support services should incorporate mindfulness training into student success programs, serving as both preventive measures and targeted interventions for students struggling with academic challenges, particularly during critical transition times or major milestones. A tiered approach to service delivery, including digital delivery options, could enhance accessibility and engagement. Curriculum design considerations, such as faculty training, could also benefit from mindfulness practices. Mindfulness interventions require well-allocated resources and hybrid delivery methods. Professional development requires clear qualifications for facilitators, physical space, materials development, and ongoing evaluation. Universities should consider incorporating mindfulness training into student success and well-being strategic planning, ensuring scalability and effectiveness.

The findings have important practical implications for higher education institutions aiming to enable student success and well-being. The effectiveness demonstrated of the 15-week mindfulness program suggests that structured mindfulness training could be a valuable addition to existing student support services. The program success in enhancing academic buoyancy and psychological flow suggests it may be particularly beneficial for students requiring academic assistance or enhancing their learning experience.

These findings have important practical implications for higher education institutions seeking to support student success and well-being. The demonstrated effectiveness of the 15-week mindfulness program suggests that structured mindfulness training could be a valuable addition to existing student support services. The program's success in enhancing both academic buoyancy and psychological flow indicates that it might be particularly beneficial for students struggling with academic challenges or seeking to optimize their learning experiences.

The study's limitations include its exclusive focus on male undergraduate students from Al-Azhar University, which may affect the generalizability of the findings to other student populations. The voluntary nature of participation may introduce self-selection bias, potentially attracting students already interested in mindfulness practices. The study's reliance on quantitative data without qualitative insights, such as student feedback or subjective experiences, limits our understanding of how participants experienced and integrated mindfulness practices. The brief follow-up period with only immediate post-test assessments limits our understanding of the long-term sustainability of these improvements and prevents examination of potential fluctuations in outcomes over time.

A notable finding is the smaller effect size observed in the control dimension of academic buoyancy ($\eta^2 = .111$), suggesting that students' sense of control over academic outcomes may be more resistant to change through mindfulness training alone. Future research should explore complementary strategies or modified mindfulness approaches to address this dimension of academic buoyancy. Moreover, the emerging role of digital learning tools in contemporary education is important, as digital platforms like Headspace and Calm present opportunities for more scalable and accessible interventions. Future research should investigate the comparative effectiveness of digital versus traditional mindfulness delivery methods and potential hybrid approaches to optimize accessibility and engagement.

The study suggests several directions for future research on mindfulness, academic buoyancy, and psychological flow. Key areas for investigation include the mediating mechanisms between these constructs, individual differences in response to mindfulness training, and the relationship between these factors and academic performance. Longitudinal research examining the sustainability of mindfulness-related improvements over multiple academic years is crucial. Demographic considerations, including cross-cultural studies and addressing underserved student populations, remain important areas for future study. Methodological expansions, such as mixed-method approaches and technology-enhanced mindfulness training, could provide deeper insights into students' experiences with mindfulness practices. Implementation factors, such as program durations, delivery formats, and practice intensities, could help optimize the design and delivery of mindfulness interventions in higher education settings.

In conclusion, while this study provides strong evidence for the effectiveness of mindfulness-based training in enhancing both academic buoyancy and psychological flow among university students, the identified limitations and areas for improvement offer valuable guidance for future research. The comprehensive nature of the improvements observed, coupled with considerations of digital delivery methods and the need for longer-term follow-up, suggests that mindfulness training – in both traditional and potentially digital formats – may be a valuable tool for supporting student success and well-being in higher education settings. Future research addressing these limitations and exploring various delivery methods will be crucial in optimizing mindfulness interventions for diverse student populations.

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