



Original Research

The Effect of Mindfulness and Psychological Resilience-Based Intervention on Academic Engagement among University Students: A Quasi-Experimental Study

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Abstract

A quasi-experimental single-group pre-test post-test design with an embedded mixed-method multiple case study was used to examine the effect of a mindfulness and psychological resilience intervention on students' academic engagement. Quantitative data were gathered before and after the intervention to measure variation in academic engagement (behavioral, emotional, and cognitive aspects) and GPA. Paired sample t-test statistical analysis was used for within-participant comparisons. After each participant was qualitatively examined, cross-case thematic analysis was conducted to identify the common patterns and mechanisms underlying change. A framework for assessing the effectiveness of the intervention in a higher education setting was provided by the use of standardized processes, repeated evaluations, and the integration of quantitative and case-based data. The result reveals that cross-case thematic analysis identifies three major themes: strengthened emotional regulation, improved behavioral consistency, and enhanced cognitive flexibility and academic performance with varying intensities. Significant difference shown between pre-test and post-test intervention in emotional regulation at $t(13) = 6.803$, $P < .001$; cognitive flexibility at $t(13) = 4.861$, $P < .001$; and academic achievement (GPA) at $t(13) = 6.011$, $P < .001$. Thus, the possible benefits of incorporating such variables into learning environments are to promote students' achievement.

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INTRODUCTION

In recent decades, there has been a growing recognition of the importance of students' academic engagement in higher education due to better knowledge of the role that behavioral, emotional, and intellectual elements play in the learning process. Because of diverse emergent stressors such as environmental changes, the loss or decline of social support networks, academic expectations, forming peer connections, and managing finances, students at the higher education level experience the greatest turning point and stress (Jiayu, 2023). These numerous

academic, social, and emotional challenges demand students' adaptability and mental strength to sustain motivation, attention, and overall engagement in learning activities.

Academic engagement is a learning process that increases the attention and motivation of learners to engage them in higher-level critical thinking. It is a flexible and multidimensional concept that consists of three broad, interrelated dimensions: behavioral, cognitive, and emotional (Fredricks et al., 2004).

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Behavioral engagement is a student's positive contribution to the learning environment that can be measured through indicators like attendance, classroom behavior, and active participation in the classroom. It includes respecting the school rules, engaging in discussions that contribute to the classroom situations, asking questions, concentrating, showing persistence, and putting forth effort (Fredricks et al., 2004).

Cognitive engagement is focused on the student's investment and commitment to learning activities and the underlying skills needed to benefit from instruction. It is the level of focus and deliberate self-control required to acquire academic knowledge and academic competencies (Fredricks & McColskey, 2012). Cognitive engagement includes concepts like self-control, goal-oriented learning, investment in learning, and metacognitive skills (Fredricks & McColskey, 2012).

Emotional engagement, often used interchangeably with psychological engagement, explains how the learner interacts emotionally and identifies with the learning environment (Wang & Holcombe, 2010). It includes the emotive components of engagement, such as enjoyment, support, a sense of belonging, and attitudes toward peers, teachers, learning, and the institution in general. A student's positive perceptions of the university, staff, and peers foster positive engagement in their learning, and students who are fully engaged perform better because this engagement empowers them to shape their learning experiences (Bryson, 2016). In this study, students' academic engagement is defined as the degree of attention, interest, enthusiasm, and motivation cognitively, emotionally, and behaviorally that students show in their learning to be successful.

When students are deeply engaged, they feel motivated to try harder and improve themselves and actively seek opportunities to develop knowledge and skills that enhance their academic performance. Motivation, engagement, and meaningful interest in the learning process enhance student learning. This suggests that

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student involvement encourages learning by motivating students to take ownership of their development and to consistently practice the abilities necessary to achieve their goals. Student involvement is an essential aspect of academic performance that is evaluated based on how students act, think, and feel in relation to academic tasks (Artika et al., 2021). Academic engagement is therefore thought to be a guarantee for students' best and most efficient learning to become critical, analytical, and creative. Growing self-assurance makes learning fun and appealing, which eventually enhances academic achievement.

However, sustaining engagement requires psychological resources that support students in managing stress and maintaining focus on their goals. Among these psychological resources, mindfulness and resilience have emerged as essential variables and topics of interest that support students in coping with these challenges. These variables are viewed as positive factors that enhance students' academic engagement and contribute to their academic success. With respect to this concept, Dexing et al. (2021) explained that in the higher education context, mindfulness and psychological resilience are key competencies to allow students to approach their education with optimal training opportunities for better academic performance.

Mindfulness in this study is defined as the deliberate, nonjudgmental awareness of one's feelings, thoughts, and experiences in the present moment. Mindfulness provides students with a useful strategy that helps them to create responsive learning environments by improving self-awareness, focus, and cognitive flexibility. A mindful learner exhibits openness to novelty, contextual sensitivity, and the capacity to recognize several methods of problem-solving while maintaining present-moment awareness. Students who are in this level of awareness are better able to identify internal and external resources, make better decisions, and have more influence over their educational experiences (Lotz, 2022). This enables students to recognize their feelings with curiosity and lessen negative actions.

Furthermore, concentration, engagement, self-worth, and attention span are all improved by mindfulness. Hence, pupils benefit from mindfulness and have better learning opportunities. It was suggested that mindfulness exercises have desirable effects on students' thoughts and feelings. It promotes relaxation and directs attention away from negative thoughts. Mindfulness practice enhances students' absorption of academic tasks while decreasing mental disturbance, contemplation, and anxiety (Henriques, 2021). Promoting awareness of the present, including what one is sensing and feeling in the moment, helps learn how to disengage from upsetting ideas and feelings. These kinds of mindfulness activities have been revealed to minimize exam stress, enhance classroom focus, and boost learner engagement, all of which eventually lead to higher academic accomplishment (Minkos et al., 2018). Mindful individuals are open to innovation, sensitive to context, and aware of various approaches to solving a problem. Because of this, mindfulness practices have gained popularity recently in a variety of secular contexts, including healthcare, education, workplaces, and schools worldwide (Dexing et al., 2021).

Psychological resilience in this study is defined as the dynamic process of using mental, emotional, and behavioral flexibility to constructively adjust to academic hardship. In spite of obstacles or difficult situations, it entails the ability to endure, keep a positive attitude, and maintain strong success motivation (Fínez & Morán, 2015). Psychological resilience is a dynamic capability that allows students to acquire skills that help them face uncertain futures with optimism and a positive attitude (Fínez & Morán, 2015). This trait allows them to engage in learning activities and effectively manage academic expectations (Fínez & Morán, 2015). Psychological resilience has a number of benefits for students' well-being, such as overcoming stressful situations and pressure arising from their studies, as well as giving the strength needed to overcome hardships in their lives. Psychological

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resilience enables students to persevere in their tasks and maintain a positive attitude when difficulties arise and sustain them at high levels of achievement motivation and performance, despite the presence of stressful events in their learning (Akudo, 2020). Psychologically resilient students adjust themselves to the existing academic stress situation to confront overwhelming academic tasks. Such students have effective coping mechanisms and are able to gather the resources at their disposal, seek assistance when necessary, and figure out how to handle the circumstances. They can use their skills and strengths to respond to life's challenges. Resilience is essentially the ability to persevere through difficult academic situations by developing optimism, self-assurance, and a positive attitude toward learning from failures.

Without psychological resilience and mindfulness, it is challenging to support student success because their absence directly hinders academic engagement, effective learning, and retention. Moreover, there is a significant lack of empirical research that examines the combined effect of psychological resilience and mindfulness on academic engagement, particularly in non-Western higher education settings such as Ethiopia.

The literature has not thoroughly investigated these factors in the Ethiopian setting, making them comparatively understudied. Furthermore, they provide promising ways to improve involvement. It is also explicitly proposed that psychological resilience and mindfulness enhance learning engagement by encouraging wellness, enhancing memory, and lowering stress, thereby increasing students' confidence in their academic achievement. While there are diverse ways of practicing mindfulness and resilience, such as yoga, meditation, breathing techniques, and sensory relaxation, this study makes use of self-compassion activities and structured breathing. These methods were chosen due to their simplicity, ease of student adoption, and efficacy in enhancing emotional and cognitive functioning,

such as focus, memory, and decision-making skills (Garg, 2024).

Intervention techniques are used in practical self-compassion and guided breathing exercise training. Breathing practice is intended to improve emotional control, lower physiological arousal, and anchor attention in the present. Because mindful breathing improves self-awareness, emotional balance, and resilience under stress, it is quite beneficial in overwhelming circumstances (Joyce et al., 2018). Breathing decreases blood pressure and heart rate by transmitting relaxation signals to the brain, which helps the body enter a peaceful mood and lessen negative thoughts. As a result, three research-proven breathing strategies were selected due to their advantages for the body and mind:

Deep breathing entails deliberate, steady breathing that causes the diaphragm to expand, encouraging relaxation, better blood flow, and increased cognitive performance (Konov, 2024).

Resonance breathing optimizes heart rate variability to reduce stress and depression while enhancing mood and general well-being by regulating breathing to five cycles per minute (Cronkleton, 2022)

Affirming-phrase breathing focuses on positive self-talk that fosters well-being and mental serenity. The students are guided to affirm what they would like to succeed with when inhaled and affirm to get rid of negative things when they breathe out. For example, "I breathe in peace, happiness, and success." "I breathe out anger, frustration, incapability, and stress" repeatedly. These methods regulate negative thoughts, increase resilience in difficult situations, and induce physiological calm by lowering heart rate and blood pressure.

Self-compassion comprises treating oneself with sympathy and nonjudgment during disappointment or adversity, as well as minimizing severe self-criticism and endorsing a balanced view of perspective in order to foster resilience. It is used as a method for nurturing emotional resilience by inspiring the intentional acknowledgment and confirmation of demanding

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emotional states rather than repressing them (Gupta, 2024). This practice has been connected with several remarkable benefits, including enhanced emotional control, lessened stress, lower levels of nervousness and discontent, and higher levels of cheerfulness and life satisfaction (Gupta, 2024). There are three organized methods for engaging in self-compassion practice:

Mindfulness is recognizing one's painful emotions without passing judgment (e.g., recognizing "This is stress"). Common Humanity acknowledges that imperfection and suffering are common human experiences. Self-kindness is actively providing warmth and support to oneself (e.g., by placing a hand on the heart and saying nice things). These techniques support people in maintaining psychological equilibrium, improving resilience, and managing emotional suffering. In this study, self-compassion and breathing exercises that promote mindfulness enhanced students' academic engagement.

Statement of the problem

Despite the recognized importance of academic engagement for student success in higher education (Fredricks et al., 2004), a significant gap exists in understanding how to effectively promote and sustain engagement among university students, particularly in non-Western educational contexts. University students in Ethiopia face academic pressures, financial constraints, social adjustment difficulties, and the psychological burden of transitioning to higher education. These stressors often manifest as reduced classroom participation, procrastination, emotional exhaustion, disengagement from learning activities, and, consequently, poor academic performance.

Preliminary observations and institutional reports suggest that many Ethiopian university students struggle with maintaining consistent behavioral, cognitive, and emotional engagement (Mekonnen et al., 2025). However, there is a scarcity of empirically validated interventions designed to address these engagement challenges within the Ethiopian higher education landscape.

While mindfulness-based interventions and resilience training have demonstrated effectiveness in improving student well-being and academic outcomes in Western settings (Dexing et al., 2021), their combined and integrated effects on the multidimensional nature of academic engagement remain largely unexplored (Henriques, 2021). Specifically, no quasi-experimental study has systematically investigated how a structured intervention combining mindfulness practices (e.g., breathing techniques, self-compassion exercises) and psychological resilience-building activities simultaneously influences behavioral, cognitive, and emotional dimensions of academic engagement among Ethiopian university students.

Furthermore, existing literature reveals a critical gap in understanding the mechanisms through which such interventions produce their effects (Reivich & Shatté, 2002). Although Self-Determination Theory suggests that mindfulness and resilience may enhance engagement by fulfilling basic psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 2000), empirical evidence tracing how these processes unfold over time—and how students subjectively experience these changes—is notably absent (Cherry, 2025). Most prior studies have relied solely on quantitative pre-post designs without capturing the qualitative, contextualized experiences of participants that could explain why and for whom the intervention works (Fredricks & McColskey, 2012).

Research questions

This study seeks to address the gaps by examining the effect of a mindfulness and psychological resilience-based intervention on academic engagement (behavioral, emotional, and cognitive dimensions) and academic achievement (GPA) among Ethiopian university students. Then the current study is directed by the following research questions.

1. To what extent does the practice of mindfulness and resilience intervention increase

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students' academic engagement as measured by behavioral indicators?

2. Do mindfulness and resilience interventions increase students' academic engagement as measured by indicators of cognitive engagement?

3. To what extent do mindfulness and resilience interventions increase students' academic engagement as measured by indicators of emotional regulation?

4. Is there a significant difference between pre- and post-intervention of mindfulness and resilience-based exercise on students' academic achievements?

5. How do emotional control, behavioral factors, and cognitive flexibility interact to improve academic achievement?

MATERIALS AND METHODS

Design

This study used a quasi-experimental single-group pre-test–post-test design with an embedded mixed-method multiple case study to examine the impact of a mindfulness and psychological resilience intervention on students' academic engagement. Quantitative data were collected both before and after the intervention to measure variations in academic engagement across the indicators of behavioral engagement (attendance and grades), cognitive engagement (attention and cognitive flexibility), and emotion regulation of engagement variables and GPA. Mindfulness and psychological resilience practice were operationalized through an eight-week structured intervention with two sessions per week. Each session lasted approximately 8 minutes, resulting in a total weekly practice time of 16 minutes and a cumulative intervention duration of 128 minutes. In addition to pre- and post-outcome measures, progress monitoring was used throughout the intervention to assess for changes in participants' engagement behaviors. Using a census sampling technique, all 14 eligible second-year, first-semester undergraduate psychology students were included in the study.

Intervention Procedure

To ensure informed consent and promote participation, participants were told about the objective, advantages, and methods of the psychological resilience and mindfulness exercises before the intervention. The intervention used breathing and self-compassion techniques.

Breathing techniques

Three organized breathing techniques were used in the intervention, and each was practiced for about two minutes: Deep Breathing: With an emphasis on diaphragmatic expansion, participants were told to breathe slowly and deeply through their noses and exhale slowly through their mouths. Resonance Breathing: Participants were guided to breathe in and out comfortably in a slow and steady manner. Affirming phrase breathing- This technique integrates breath with cognitive reorganization. Participants were drilled to deliberately release a negative emotion or thought (like anxiety, self-doubt, stress, and frustration) on the breath out and to mentally confirm an anticipated good quality (such as peace, success, or capability) when breathing in.

Self-compassion practice

Self-compassion exercise: Participants were led through a three-step procedure. First to develop awareness, students were told to thoughtfully observe and recognize their current feelings non-judgmentally. Second, they were encouraged to realize that stress is a universal and inevitable part of life and were inspired to acknowledge the humanity of their experience. Lastly, they were directed to practice an act of self-kindness by putting their hands on their hearts and saying something kind, like "I am patient and strong; I am resilient and will move forward." Participants were also motivated to independently apply this technique in their dorms or at any comfortable settings whenever they experience stress or anxiety.

Instruments and Data Collection

To measure academic engagement, the University Student Engagement Inventory (USEI), which was

Sci. Technol. Arts Res. J., April. –June, 2026, 15(2), 25-41 developed by Maroco et al. (2016), was adapted and used. The questionnaire consists of 23 items that have three dimensions: behavioral engagement (7 items), emotional engagement (6 items), and cognitive engagement (10 items). It is a five-point Likert scale ranging from 1 (never) to 5 (always). To measure change, the questions were administered before and after the intervention. Trustworthiness was checked using students' self-reported time spent using the mindfulness and resilience strategies, as well as their attendance at each intervention session.

Students' freshman academic performance (pre-intervention baseline) and the second year (post-intervention) were collected from the university registrar, and students' GPA was used to measure academic performance.

Reliability of the instrument

Reliability analysis using Cronbach's alpha indicated the instrument possessed acceptable to good internal consistency: $\alpha = .73$ for the emotional engagement subscale, $\alpha = .72$ for the behavioral engagement subscale, $\alpha = .75$ for the cognitive engagement subscale, and $\alpha = .87$ for the total 23-item scale. To establish validity, the questionnaire's face validity, content validity, and construct validity were evaluated and confirmed by a panel of subject matter experts in psychology.

Data analysis

Data collection occurred longitudinally: at baseline (pre-test), throughout the intervention period (monitoring data), and immediately post-intervention (post-test). Adherence and engagement were monitored via session attendance and researcher observations. SPSS Version 25 Statistics analysis was used for quantitative data analysis. Then, descriptive statistics like percentages, means, and standard deviations were calculated for academic engagement indicators. To determine whether there is a statistically significant difference between the pre- and post-tests of academic engagement scores, a paired-samples t-test was computed.

Ethical Considerations

Research ethics include getting informed consent, confirming voluntary participation, and protecting the privacy and confidentiality of participants. In obedience to these principles, participants in this study were provided with detailed information about the research. They were explicitly informed of their right to decline or withdraw from participation at any time without penalty. To protect participant privacy, all data were treated with strict confidentiality, and anonymity was assured by ensuring no individual scores or identities would be disclosed in any public reporting.

RESULTS AND DISCUSSION

Results

Demographic characteristics of participants

The total number of participants was 14, of which 7 were male and 7 were female students. Their ages range from 21 to 23 years. With regard to GPA, one student has 3.01; eleven students are in the range of 2.00 to 2.51, while two students are below 2.0. Concerning session attendance, 6 of them attended the whole session (16/16, 100%), 5 of them attended for 15/16 (93.75%), and 3 of them attended for 14/16 (87.5%). The details of the demographic variables of the participants are indicated in Table 1.

Table 1

Demographic variables of the participants

Name	Sex	Age	GPA	Session attendance	Attendance in percentage (100%)
Bon	Male	21	3.01	15	93.75
Dag	Female	21	2.47	16	100
Get	Male	22	2.41	14	87.5
Thg	Male	22	2.38	15	93.75
Nhl	Male	21	2.47	15	93.75
Rab	Female	21	2.07	15	93.75
Mnt	Female	21	1.91	14	87.5
Fbn	Female	22	2.02	15	93.75
Wre	Male	21	2.51	16	100
Ayn	Female	21	1.99	16	100
Zns	Female	21	2.05	16	100
Nhl2	Male	22	2.10	16	100
Aynt	Female	21	2.15	16	100
Ebr	Male	23	2.25	14	87.5

Single case analysis of academic engagement (emotional control, behavioral activity, and cognitive flexibility) and grade point average

A single case analysis of participants' pre- and post-intervention scores on emotional control, behavioral engagement, cognitive flexibility, and Grade Point Average (GPA) was examined. The

results indicate that the mindfulness and resilience-based intervention produced positive changes in academic engagement for the majority of participants, with corresponding improvements in academic performance. Overall, the findings provide insight into the variability of intervention effects across students with different academic profiles and levels of classroom participation.

In the analysis of emotional regulation, all participants showed improvements and fell in the range between 1 and 9 points. This enhancement suggests that the intervention was effective in improving students' capacity to control their emotions in the academic context. Similarly, 13 students out of 14 had developed cognitive flexibility, and significant improvements were found (e.g., Nhl2 increased from 31 to 49 and Mnt from 35 to 47). These trends display that the activities encouraged students' capacity to change their viewpoints, adjust to difficult situations in learning, and use more adaptable thinking techniques.

In contrast, behavioral engagement demonstrated more variety among students. For instance, participants (Bon, Dag, Rab, Ayn, and Aynt) had a slight decline in their behavioral engagement levels, whereas the majority of other pupils showed an increment. These conflicting results suggest that the intervention enhanced the internal psychological engagement (e.g., emotional and cognitive aspects), while not every

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student's external behavioral engagement was consistently increased because of the intervention.

Regarding academic performance, 13 students of the 14 improved in their GPA, with several notable improvements (e.g., Bon from 3.01 to 3.88, Wre from 2.51 to 3.58, and Ayn from 1.99 to 2.92). This growing trend shows that improvements in emotional and cognitive engagement have led to remarkable improvements in academic performance for most pupils. However, only one exceptional person (Thg) had a slight decline in GPA (from 2.38 to 2.33), despite all engagement metrics showing rises. The cause of this discrepancy may be the result of external factors unrelated to the intervention, such as inconsistent effort, insufficient motivation, or poor focus.

In general, a single-case analysis demonstrates that the intervention had a positive effect on students' emotional regulation, cognitive flexibility, and academic performance, whereas behavioral engagement results differ among participants.

Table 2

Pre- and post-test academic engagement (emotional regulation, behavioral engagement, and cognitive flexibility) and grade point average (GPA) (N=14).

Name	Emotion 30%		Behavior 35%		Cognitive flexibility 50%		GPA	
	Pre-test	Post-test	Pre-test	Post-test	Pre-t	Post-test	Pre-test	Post-test
Bon	24	26	27	26	37	43	3.01	3.88
Dag	23	27	29	27	42	43	2.47	3.25
Getl	23	28	24	30	30	37	2.41	3.00
Thg	18	27	21	30	30	37	2.38	2.33
Nhl	26	28	20	25	33	44	2.47	2.83
Rab	26	27	28	22	39	43	2.07	2.92
Mnt	24	28	28	30	35	47	1.91	2.08
Fbn	23	27	25	25	36	35	2.02	2.13
Wre	20	24	22	24	34	42	2.51	3.58
Ayn	24	29	21	20	36	42	1.99	2.92
Zns	26	28	25	27	41	43	2.05	2.58
Nhl2	21	27	22	30	31	49	2.1	3.00
Aynt	25	28	24	23	38	42	2.15	2.83
Ebr	24	26	28	26	36	40	2.25	2.46

The consistency of post-intervention GPA improvement among nearly all participants provides support for the practical effectiveness of

mindfulness and resilience practices in fostering academic success. Thus, these findings suggest that enhanced psychological engagement

contributes meaningfully to improved GPA outcomes (Table 2).

A cross-case thematic analysis of academic engagement (emotional control, behavioral activity, and cognitive flexibility) and grade point average

A cross-case thematic analysis was also conducted to identify recurring patterns in students' academic engagement (emotional control, behavioral activity, and cognitive flexibility) and academic performance (GPA) following the mindfulness and psychological resilience intervention. The combined findings revealed three main themes: a) reinforced emotional regulation, b) improved behavioral consistency and academic effort, and c) enriched cognitive flexibility and academic performance. Although there were varying intensities, these themes were consistently reflected across participants.

Theme 1: Strengthened Emotional Regulation

The majority of the participants showed noticeable enhancements in emotional regulation, as shown by the improved post-test emotional involvement scores, and they reported fewer emotional interruptions but a greater ability to regulate stress during academic tasks. From the quantitative data, it was shown that almost all participants improved by 2–5 points in emotional engagement. This indicates that the resilience and mindfulness-based breathing techniques were successful in assisting students in controlling their internal emotions and aggravation, as well as remaining composed in the face of scholastic difficulties. This theme was particularly evident among students who primarily exhibited emotional instability. From the analysis, it was shown that some participants (such as Thg, Getl, and Aynt) gain the largest emotional engagement.

Theme 2: Improved Behavioral Consistency and Academic Effort

The second emerging theme was that enhancements in behavioral engagement, specifically effort, persistence, attendance, and task completion, were observed in the majority of cases. Improvements were noticeable, and many participants' behavioral scores increased after the test. For example, Thg, Mnt, and Nhl2 were among the individuals who showed some of the biggest increments in behavioral involvement; although a small number of students showed slight decreases (e.g., Bon, Ayn, Dag, and Rab), the overall pattern across cases revealed that students became more behaviorally consistent, more likely to engage actively in academic tasks, and better able to maintain sustained effort.

Theme 3: Enhanced Cognitive Flexibility and Academic Performance

Cognitive flexibility showed the most improvements across scenarios, with several individuals reflecting gains of five to ten points. Students developed the capacity to adapt their viewpoints, adjust their way of thinking, handle academic tasks more efficiently, and approach challenging assignments with more mental clarity. Academic performance strongly demonstrated these improvements in cognitive involvement. Thirteen out of the fourteen cases revealed improvements in GPA, and several participants (such as Bon, Dag, Wre, and Ayn) showed significant academic progress. This reflects the theoretical hypothesis that cognitive engagement affects academic success by showing a positive correlation between cognitive flexibility and academic performance. Participants who showed the greatest increases in cognitive flexibility—such as MNT, Nhl2, and Getl—also demonstrated meaningful GPA gains, indicating a convergence between cognitive development and measurable academic outcomes (Table 3).

Table 3

Cross-Case Thematic Analysis of Emotional Regulation, Behavioral Consistency, Cognitive Flexibility, and Academic Achievement

Case	Emotional Regulation	Behavioral Consistency	Cognitive Flexibility	GPA Change	Cross-Case Interpretation
Bon	Moderate improvement	Slight decline	Strong improvement	Strong increase	Emotional stability supported cognitive gains despite behavioral fluctuation.
Dag	Moderate improvement	Slight decline	Slight improvement	Moderate increase	Emotional gains offset behavioral decline.
Getl	Strong improvement	Strong improvement	Strong improvement	Moderate increase	Balanced growth across all themes
Thg	Strong improvement	Strong improvement	Strong improvement	Slight decrease	Gains did not immediately translate into GPA.
Nhl	Slight improvement	Moderate improvement	Strong improvement	Moderate increase	Cognitive flexibility drove academic gains.
Rab	Slight improvement	Decline	Moderate improvement	Moderate increase	Cognitive gains compensated for behavioral decline.
Mnt	Moderate improvement	Moderate improvement	Very strong improvement	Slight increase	Large cognitive gains with delayed GPA effect
Fbn	Moderate improvement	No change	Slight decline	Slight increase	GPA improved despite limited cognitive change.
Wre	Moderate improvement	Moderate improvement	Strong improvement	Strong increase	Clear alignment between cognitive flexibility and GPA
Ayn	Strong improvement	Slight decline	Moderate improvement	Strong increase	Emotional control enabled cognitive improvement.
Zns	Slight improvement	Moderate improvement	Slight improvement	Moderate increase	Behavioral consistency supported achievement.
Nhl2	Strong improvement	Strong improvement	Very strong improvement	Strong increase	Most coherent interaction among themes
Aynt	Moderate improvement	Slight decline	Moderate improvement	Moderate increase	Cognitive flexibility mediated GPA gains.
Ebr	Slight improvement	Slight decline	Moderate improvement	Slight increase	Incremental thematic gains reflected modest GPA change.

Improvements are a reflection of changes from pre-test to post-test scores. GPA represents the difference between before and after the intervention of academic performance. Thematic interpretations that combined quantitative patterns with qualitative meaning were developed through

cross-case comparison. Academic achievement was primarily influenced by cognitive flexibility, behavioral consistency functioned as a reinforcing mechanism, and emotional regulation was a key catalyst.

Table 4*Cross-Case Theme Synthesis*

Theme	Cross-Case Pattern
Emotional Regulation	Improved in almost every instance; served as a stable basis
Behavioral Consistency	Mixed changes; supportive but not sufficient alone
Cognitive Flexibility	The most reliable indicator of GPA improvement
Academic Achievement (GPA)	The greatest improvements were detected when cognitive flexibility was significantly improved.

Cognitive flexibility was found to be the most important theme associated with GPA improvement, and emotional regulation was consistently the basic catalyst that enabled continuous involvement (Table 4). By serving as a reinforcing mechanism, behavioral consistency enhanced the impacts of emotional and cognitive increases, although having little independent relevance. The findings support an interactional model that holds emotional control enables behavioral persistence, which in turn fosters cognitive flexibility—the primary factor affecting academic achievement.

Group case analysis of pre-test and post-test analysis

A comparison of pre-test and post-test scores was conducted to examine the effects of the mindfulness and resilience intervention on students' academic engagement (namely, emotional regulation, behavioral engagement, and cognitive flexibility) and academic performance.

As shown in Table 2, most participants demonstrated marked improvement in emotional regulation and cognitive flexibility following the intervention. These improvements were accompanied by corresponding increases in students' grade point averages at post-test.

In contrast, changes in behavioral engagement were less consistent across participants. Although some students showed improvement in behavioral engagement from pre-test to post-test, the magnitude of change was variable and, in several cases, minimal. Overall, the findings indicate that the intervention was more effective in enhancing emotional and cognitive aspects of academic engagement than behavioral engagement.

Graphical Presentation of Results

The data shown in Table 2 is further summarized using line graphs in Figures 1 and 2. Figure 1 represents changes in students' academic engagement variables, while Figure 2 shows increases in academic accomplishment as determined by grade point average.

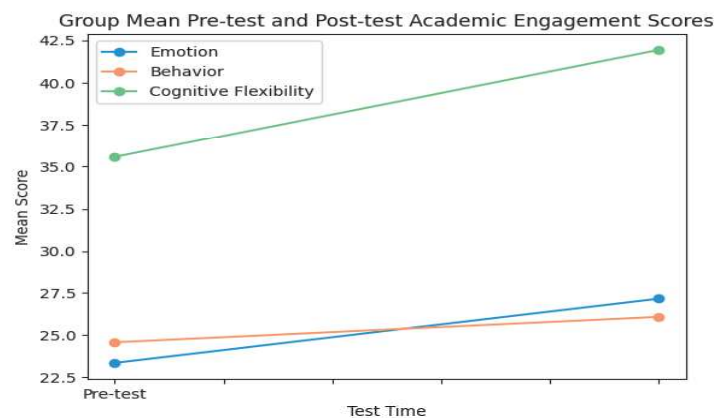


Figure 1. Line Graph of Group Mean Pre-test and Post-test Scores for Emotional Regulation, Behavioral Engagement and Cognitive Flexibility

Figure 1 demonstrates the group mean of pre-test and post-test scores of academic engagement (emotional, behavioral, and cognitive flexibility). The graph indicates a clear and consistent increase in emotional regulation and cognitive flexibility from pre-test to post-test, reflecting predictable

and meaningful improvement following the mindfulness and resilience intervention. Contrariwise, behavioral engagement shows less consistent change, suggesting that behavioral responses were more variable and less responsive to the intervention at the group level.

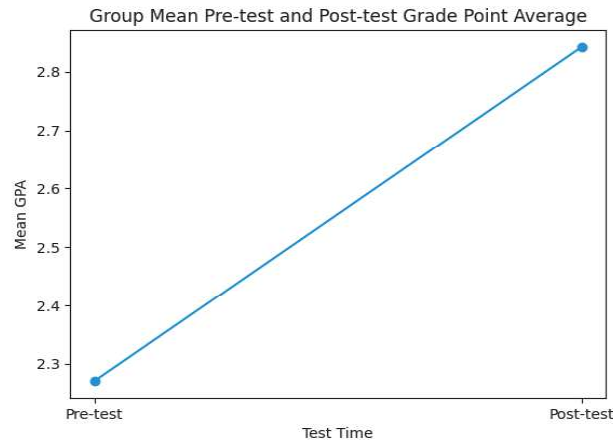


Figure 2. Line Graph of Group Mean Pre-test and Post-test Grade Point Average

Figure 2 illustrates the group means' grade point average before and after the intervention. The line graph reveals a notable increase in GPA from pre-test to post-test, indicating an overall improvement in academic performance among participants. Although the majority of students demonstrated GPA gains, one participant (Thg) showed a slight decline, which did not alter the overall positive group trend. To examine whether there is a significant difference between pre- and post-test intervention, a paired sample t-test was conducted.

Paired sample t- test was computed to check whether there is a significant difference between pre- and post-intervention academic engagement (behavioral, emotional, and cognitive aspects) and students' grade point average. Accordingly, the result revealed that there was a significant difference between pre- and post-intervention emotional regulation at $t(13) = 6.803$, $P < .001$; cognitive flexibility at $t(13) = 4.861$, $P < .001$; and academic achievement (GPA) at $t(13) = 6.011$, $P < .001$.

Table 5

Dependent Sample t-Test of Academic Engagement Sub-Scales

Variables	Pre-test	Post-test	Mean difference	Mean SD	t (13)	P value
Emotional control	23.35	27.14	3.79	1.79	6.80	0.000
Behavioral activity	24.57	26.07	1.50	3.13	1.32	0.208
Cognitive flexibility	35.57	41.92	6.36	3.76	4.86	0.000
GPA	2.27	2.84	0.57	0.40	6.01	0.000

The result shows that students' emotional regulation and cognitive flexibility were significantly improved after the mindfulness and resilience intervention was practiced by the learner. This implies that the intervention has a positive effect on students' academic engagement,

which in turn has a positive impact on students' GPA. On the other hand, behavioral activity shows that there was no significant difference between pre- and post-intervention at $t(13) = 1.324$, $P = .208$. This reveals that mindfulness and resilience interventions on students' behavioral engagement

did not bring any significant change to improve students' academic engagement in their learning (Table 5).

The interaction of the three themes (behavioral factors, emotional regulation, and cognitive flexibility) in improving students' academic achievement

Based on the findings of the cross-case thematic analysis, behavioral consistency is made possible by emotional regulation, and when these factors are combined, they foster cognitive flexibility, which most directly leads to improvements in GPA.

Suggested interaction model based on the themes

1. Emotional Control → Behavioral Consistency: Students who have better emotional control are better able to handle their displeasure when faced with academic obstacles, which may be a precursor to better behavioral consistency and academic effort. This is due to the fact that someone who is emotionally overwhelmed cannot consistently persevere on a task (behavioral).

2. Emotional Control + Behavioral Consistency ⇒ Cognitive Flexibility: The required experience and exposure to academic content are provided by the "sustained effort" and active task involvement (Theme 2). The "enhanced cognitive flexibility" (Theme 3)—the capacity to adjust thinking, recognize connections, and resolve challenging issues—is made possible when combined with a tranquil mind (Theme 1). To think flexibly, the mind must be clear (via emotion) and present (through behavior).

3. Cognitive Flexibility → Academic Performance (GPA): Theme 3 has the strongest correlation with GPA. Higher comprehension, more efficient study techniques, and higher performance on tasks and tests are all correlated with the capacity for flexible thought.

The themes don't work alone. They comprise a networked system. Emotional regulation is the primary catalyst, behavioral consistency is the reinforcing engine, and cognitive flexibility is the

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product that most directly affects academic achievement.

DISCUSSION

This study examined the extent to which resilience and mindfulness interventions can affect academic engagement in terms of behavioral, emotional, and cognitive engagement that can impact academic achievement. The finding revealed that there were significant improvements in the emotional and cognitive domains following the intervention, so participants gained in emotional control and cognitive flexibility, which in turn positively impacted academic performance as reflected in improved grade point averages (GPAs). This is consistent with well-established research that suggests cognitive engagement—which includes dedication, focus, self-control, and goal-oriented learning—is a crucial factor in academic performance (Fredricks & McColskey, 2012). According to Wang and Holcombe (2010), emotional engagement, which is defined by good affect toward peers, teachers, and learning settings, encourages increased attention and focus, which supports academic success. In a similar vein, increased attention and focus are nurtured by emotional engagement, a positive affect toward peers, teachers, and learning settings (Wang & Holcombe, 2010).

On the other hand, behavioral engagement, as determined by metrics like participation, attendance, and on-task conduct, did not considerably improve with mindfulness and resilience intervention. This may be due to the fact that observable behaviors like student interaction in the class through nodding in agreement or smiling, participating in raising questions, and/or responding, while important, may not fully capture the depth of internal engagement required for sustained academic retention. With respect to this finding, recent educational research noted that behavioral measures alone may not reflect the qualitative dimensions of student involvement. Without corresponding cognitive and emotional investment, behavioral compliance may not translate into meaningful learning gains.

From the result of an independent t-test, it was shown that students' emotional control, cognitive flexibility, and academic achievement show a significant difference between pre- and post-intervention of mindfulness and resilience. This implies that mindfulness and resilience-based interventions have a significant positive effect on students' cognitive and emotional matters, which in turn have a direct positive effect on students' grade point average.

These results are consistent with prior studies on mindfulness in educational contexts. For instance, Minkos et al. (2018) found that mindfulness practices have the potential to effectively increase students' academic engagement and enhance students' awareness and engagement in learning. Similarly, Lin (2020) stated that mindfulness helps students to be aware of the learning situations. In contrast, Sandra et al. (2019), in their finding, reported that mindfulness indirectly supports students' academic achievement through increased engagement, particularly in cognitive and emotional domains. Moreover, Sandra et al. (2019) also confirmed that mindfulness facilitates students' thoughts and increases the levels of engagement, which consequently results in improvement of academic performance. Furthermore, Franco et al. (2010) and Bellinger et al. (2015) affirmed that mindfulness improves attention, emotional balance, and stress management—factors that contribute to optimal academic performance even under demanding conditions.

Similarly, the study conducted by Artika et al. (2021) suggested that student engagement was positively explained and predicted by mindfulness. Mindfulness encourages changes in academic performance through enhancing certain cognitive skills like attention, concentration, and memory, positive feelings, and emotional balance that can support optimal performance even in demanding situations (Franco et al., 2010). This is because mindfulness potentially helps students feel more relaxed, less afraid, and happier while studying and helps students develop a greater awareness of their body, mind, and emotions. Therefore,

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mindfulness is an essential component in changing students' thinking and emotional responses to support students' academic performance (Bellinger et al., 2015). This shows that there is a positive and significant relationship between mindfulness and academic performance.

In this study, a psychological resilience-based intervention has shown a significant positive effect on students' academic engagement. In support of this finding, Borman and Rachuba (2021) indicated that psychologically resilient students are found to be more engaged in their academic setting. Romano et al. (2021) also suggested that psychological resilience is the determining factor for emotional support in fostering students' engagement. They have also underlined the importance of practical interventions for students in the school context as an important way to foster students' engagement through preventing maladjustment. It is obvious that students from low- to middle-income countries like Ethiopia are faced with the severity of psychosocial and socioeconomic stressors. Thus, enhancing students' psychological resilience helps as a protective factor in the face of stressors and serves as an important determinant of student success, which is gained through academic engagement.

Similarly, McCain (2021), in his study, found that student academic engagement and psychological resilience significantly contribute to Black male academic achievement. Psychological resilience strengthens and promotes student success for optimal performance in higher education. Furthermore, mindfulness can create strong thoughts that lead students to be more resilient in their learning (Anindita & Etikariena, 2020). Psychologically resilient students maintain high levels of academic achievement even in the face of stressful and complicated circumstances. This implies that when students are psychologically resilient and in a mindfulness state, they will enjoy learning more, which in turn makes them more engaged and leads to better learning performance.

The cross-case theme analysis's findings demonstrate how behavioral elements, emotional

regulation, and cognitive flexibility interact as a dynamic, interconnected system to affect students' academic performance. Overall, the findings support a hierarchical interaction model where emotional control serves as the primary catalyst, behavioral consistency serves as the reinforcing mechanism, and cognitive flexibility serves as the primary path to enhanced academic achievement. This integrated approach highlights the importance of interventions that simultaneously target the emotional, behavioral, and cognitive domains in order to effectively support students' academic advancement.

CONCLUSIONS

This study offers empirical support for the integration of resilience and mindfulness interventions, which greatly improve the emotional and cognitive engagement of university students. The intervention demonstrated several advantages, including improved memory span and internal self-regulation that enhanced attention and cognitive flexibilities like self-awareness, values, thoughts, and attentiveness. Additionally, it improves affective competencies, such as emotional regulation, that assist in lowering stress and anxiety, thereby creating a favorable internal environment that promotes improved learning and academic performance. Academic accomplishment is directly impacted by mindfulness, which primarily enhances emotional and cognitive engagement. Together with mindfulness, psychological resilience enables pupils to stay focused and perform at their best under pressure.

Recommendations

Universities may consider and include resilience and mindfulness training in their orientation programs. This is because it is a crucial academic skill that fosters engagement and well-being. Interested future researchers may include control groups to effectively support causal conclusions. Longitudinal designs could also be advisable to assess the durability and strength of the effects of the intervention.

CRedit Authorship Contribution Statement

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The author confirms sole responsibility for the entire scope of this manuscript, including study conception, methodology design, data collection, analysis, and manuscript preparation.

Declaration of Competing Interest

There was no conflict of interest.

Ethical Approval

The data were collected based on the permission of the University administration and the consent of all participants.

Data Availability Statement

Upon reasonable request, the corresponding author will provide the data.

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