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Longitudinal Effects of a Combined Cognitive-Behavioral Therapy and Mindfulness-Based Stress Reduction Programme on Test Anxiety, Mindfulness, Academic Achievement, and Well-Being among TVET and Education Students in Nigerian Universities

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ABSTRACT
In an academically challenging context, with declining academic achievement and cognitive distress among students, incorporating behavioural therapy and stress-reduction techniques is crucial to improving practical skills acquisition and career prospects. This study assessed a combined CBT-MBSR programme to reduce test anxiety and improve academic performance and well-being among Business education students in two Nigerian universities. Employing a randomised controlled trial with a pre-test post-test design, the research drew responses from 394 students from two universities in Southeast Nigeria. Participants were randomly assigned to either the treatment or waitlist control groups, based on set inclusion criteria. Data collection used four instruments, and the

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treatment group participated in a CBT-MBSR program. We evaluated both groups at three time points: before the intervention, immediately after, and during follow-up. We analysed the data using repeated-measures ANOVA and Multivariate Analysis of Covariance (MANCOVA). The results indicated that Business education students who underwent the CBT-MBSR intervention showed significantly reduced test anxiety scores in post-treatment

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compared to those in the waitlist control group. Business education students who received the CBT-MBSR programme had significantly lower post-treatment test anxiety than the waitlist control group, and gains in mindfulness and subjective fitness were maintained at three-month follow-up. The programme also had a significant multivariate effect on test anxiety ($F = 1168.52$, $p < .001$, partial $\eta^2 = .752$), academic achievement ($F = 1381.64$, $p < .001$, partial $\eta^2 = .746$ and well-being ($F = 768.40$, $p < .001$, partial $\eta^2 = .768.40$). This study assessed the efficacy of CBT with MBSR in reducing test anxiety, improving academic performance, and increasing well-being among students in TVET settings. The study showed that CBT reduced test anxiety, thereby improving students' academic performance by sharpening their concentration. Thus, the study added to the literature on improving psychological well-being and educational performance by introducing a new method that combines MBSR and CBT, enriching the literature with a dual-modality approach that helps students reduce anxiety and foster personal growth. The study discussed practical implications for university administrators, educators, and researchers and offered several recommendations.

Keywords: Anxiety, Cognitive-Behavioral Therapy, Mindfulness-Based Stress Reduction, Evaluation and Measurement in Vocational and Technical Education, Stress, Business education students.

INTRODUCTION

Few academic difficulties follow students from the lecture hall to the examination room as persistently as anxiety. Academic anxiety can affect students' thinking, emotions, physical functioning, study behaviour, and examination performance (Bayangard, 2018; Bota, 2024; Jannah & Setiyowati, 2024). It commonly involves negative interpretations of academic demands, heightened physiological arousal, and coping responses that may unintentionally maintain or intensify distress. Recent studies have associated academic anxiety with perceived threat, prolonged stress, avoidance, and catastrophic thinking (Edeh et al., 2025; Alhashim, 2024; Jarso et al., 2024). Students may experience persistent worry, intrusive thoughts, sleep disturbance, muscular tension, sweating, and difficulty relaxing. The consequences may extend beyond academic work to students' social relationships, psychological development, and general well-being.

Test anxiety is a specific form of academic anxiety that occurs when students anticipate, experience, or reflect on situations involving evaluation. It does not indicate limited intelligence or academic potential. Rather, it reflects the psychological burden that students may attach to being assessed (Torrano et al., 2020). Distress may occur before, during, or after an examination and may adversely affect achievement (Eifediyi et al., 2016). Jarso et al. (2024) describe test anxiety as a multidimensional problem involving cognitive, physiological, and behavioural symptoms. At the cognitive level, students may ruminate, doubt their abilities, and criticise themselves. At the physiological level, they may experience tension, trembling, sweating, and a racing heartbeat. At the behavioural level, they may avoid studying, procrastinate, or engage in excessive and poorly organised preparation. Excessive worry can also interfere with the encoding and retrieval of information when it is needed during an examination (Yılmazer et al., 2024). These components often reinforce one another, making test anxiety difficult to overcome without appropriate intervention.

The Nigerian evidence is concerning. Nwuba et al. (2024) reported that a substantial proportion of students experience high anxiety during tests and terminal examinations, with negative implications for performance in standardised assessments. Anxiety may impair concentration, memory, confidence, and decision-making (Agu et al., 2025; Williamson et al., 2024). When prolonged, academic pressure may also contribute to exhaustion and burnout (Williamson et al., 2024). Students may respond by delaying preparation, avoiding study, or over-preparing in a compulsive manner. These behaviours can reduce the quality and efficiency of revision (Bayangard, 2018; Wadi et al., 2022; Zhang et al., 2024). Despite these consequences, anxiety symptoms are not always adequately addressed through institutional support systems (Eifediyi et al., 2016; Nwuba et al., 2024). An effective intervention should therefore consider the interaction among students' thoughts, emotions, bodily reactions, and behaviours rather than focusing on only one aspect of the problem.

The Cognitive Activation Theory of Stress (CATS) provides a useful explanation of how students experience examination-related anxiety. Formulated by Ursin and Eriksen (2004), CATS proposes that stress responses are influenced by the relationship between an individual's expectations and the conditions that are actually experienced. The intensity and persistence of stress depend partly on how a person interprets an event and whether the person believes that available responses can produce a satisfactory outcome. Recent research continues to apply response-outcome expectancies to the study of academic stress and student well-being (Lundhaug et al., 2025; Nwadi et al., 2025).

A central concept in CATS is response-outcome expectancy. This refers to a person's belief about whether a particular response will produce a favourable result. A positive response-outcome expectancy represents coping because the individual believes that effective action can improve the situation. Negative response-outcome expectancy is associated with hopelessness, while the absence of a meaningful connection between action and outcome is associated with helplessness (Ursin & Eriksen, 2004). Applied to test anxiety, the theory suggests that

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an examination may be interpreted as an overwhelming threat when students anticipate failure and doubt their ability to cope. The same examination may be viewed as a manageable academic challenge when students believe that preparation, adaptive thinking, and appropriate coping strategies can lead to a positive outcome.

This theoretical position is particularly relevant to Business Education students enrolled in Evaluation and Measurement in Vocational and Technical Education. Students may experience the course as threatening when they perceive its assessment demands as difficult, consequential, or beyond their control. They may also develop negative expectations when previous academic experiences have involved failure, criticism, or inadequate preparation. These expectations can intensify worry and physiological arousal, which may then interfere with concentration, memory, study behaviour, and achievement. Conversely, students who develop confidence in their ability to prepare and respond effectively may experience lower levels of examination-related distress.

Cognitive-Behavioural Therapy (CBT) is relevant to this process because it addresses the beliefs and behaviours that sustain negative response-outcome expectancies. CBT helps individuals identify catastrophic predictions, irrational assumptions, and exaggerated perceptions of threat. Through cognitive restructuring, students can examine the accuracy of their thoughts and replace unhelpful interpretations with more balanced appraisals. Behavioural techniques, including relaxation, exposure, rehearsal, problem-solving, and test-taking practice, can provide students with practical experiences of successful coping (Beck, 2011; Hakvoort et al., 2015; Hofmann et al., 2012; Reiss et al., 2019; Edeh et al., 2025). These experiences may strengthen students' belief that their actions can influence examination outcomes.

Evidence supports the use of CBT for anxiety-related difficulties. Reviews and meta-analyses have identified CBT as one of the better-supported psychological interventions for anxiety (Butler et al., 2006; Carpenter et al., 2018; Hofmann et al., 2019). Recent studies have also linked CBT with reductions in academic anxiety, academic stress, procrastination, burnout, and related difficulties (Eneogu et al., 2023; Evriani & Fardana, 2024; Pinto et al., 2024). Its structured format may be suitable for educational settings because it provides students with clearly defined strategies that can be practised during and after the intervention (Beck, 2011; Wu et al., 2022). CBT can be delivered individually or in groups, and group delivery may allow institutions to support more students when counselling resources are limited (Ogren, 2024; Rosendahl et al., 2024; Williamson et al., 2024).

Mindfulness-Based Stress Reduction (MBSR) complements CBT by addressing students' immediate relationship with anxious thoughts, emotions, and bodily sensations. Developed by Kabat-Zinn (1990), MBSR uses practices such as mindful breathing, body scanning, meditation, and mindful movement to cultivate present-centred and non-judgemental awareness. The purpose is not to eliminate every unpleasant thought but to help individuals observe internal experiences without automatically treating them as threats or reacting to them impulsively.

MBSR may be useful for test anxiety because students often interpret bodily sensations such as sweating, trembling, and rapid heartbeat as signs of impending failure. Through mindfulness practice, students may learn to notice these sensations without amplifying them. They may also become better able to recognise distracting thoughts and redirect attention to the task at hand. In this way, mindfulness may reduce emotional reactivity and support a more balanced response to examination demands (Yılmazer et al., 2024).

Recent evidence indicates that mindfulness-based interventions can reduce anxiety among students, although the strength of the effects varies across studies. A systematic review and meta-analysis found that mindfulness strategies were associated with lower stress, anxiety, depression, and psychological distress among university students (Bamber & Morpeth, 2018; D'Amico et al., 2023). Jaismin et al. (2023) similarly reported reductions in stress and anxiety and improvements in well-being among rural adolescents following a mindfulness programme. Kuby et al. (2015) also connected mindfulness practice with improved psychological well-being among adolescents. In a clinical adult sample, Hoge et al. (2023) found that MBSR produced anxiety outcomes comparable to those associated with a commonly used antidepressant, although findings from clinical populations should not be generalised uncritically to university students.

Evidence relating specifically to test anxiety has also strengthened. Yılmazer et al. (2024) found that mindfulness-based interventions reduced test anxiety across different age groups and delivery formats. Their findings were promising but varied considerably across studies, suggesting that intervention effects may depend on programme structure, duration, facilitator competence, participant characteristics, and the context in which the intervention is delivered. Pan et al. (2024) reported that structured MBSR programmes benefited anxiety, depression, and perceived stress among university students. However, Fulambarkar et al. (2023) cautioned that mindfulness interventions in school settings do not produce uniform effects. Brief guided exercises may improve acceptability and make mindfulness easier to incorporate into students' schedules (Janssen et al., 2018).

The combination of CBT and MBSR is therefore theoretically and practically justified. CBT primarily addresses the interpretations and behaviours that contribute to negative or helpless response-outcome expectancies. MBSR focuses on present-moment awareness, acceptance, attentional regulation, and reduced reactivity to stress-related thoughts and bodily sensations. Used together, the two approaches may address complementary aspects of test anxiety. CBT may help students reinterpret examination demands and develop confidence in their coping responses, while MBSR may help them remain calm and attentive when anxiety arises. From the perspective of

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CATS, the combined programme may help students move from perceiving examinations as uncontrollable threats to viewing them as manageable academic challenges.

Previous studies nevertheless reveal several gaps. First, CBT and MBSR have often been examined separately, although they address different processes associated with anxiety. Second, the mindfulness literature on test anxiety remains relatively recent and heterogeneous (Fulambarkar et al., 2023; Yılmazer et al., 2024). Third, Nigerian studies have documented the prevalence and consequences of test anxiety but have tested relatively few interventions (Eifediyi et al., 2016; Nwuba et al., 2024). The CBT study by Eneogu et al. (2023) focused on rural secondary-school students rather than university students in vocational education. Nwadi et al. (2025) addressed an important part of this gap by examining a combined CBT and MBSR programme among vocational education students at Nigerian universities. Their findings provide relevant Nigerian evidence for the value of combining the two interventions, but further research is needed in specific academic courses and among distinct student groups.

Fourth, test anxiety may be influenced by the demands of a particular course. Measurement and evaluation courses require students to understand theoretical principles and apply them accurately in practical assessment situations. Previous studies have associated such courses with stress, anxiety, and weak achievement (Akimov et al., 2024; Dodeen & Alharballeh, 2024; Wu et al., 2022). However, limited evidence has examined whether a combined CBT and MBSR programme can assist Business Education students taking Evaluation and Measurement in Vocational and Technical Education. Consequently, institutions may continue to rely on general anxiety programmes that do not adequately reflect the academic pressures experienced by these students. The present study addressed this gap by evaluating a 14-week, facilitator-led CBT and MBSR programme among Business Education students enrolled in Evaluation and Measurement in Vocational and Technical Education. The study used a randomised wait-list-controlled design, with assessments conducted at baseline, immediately after the intervention, and at a three-month follow-up. It was guided by CATS and examined whether the intervention could reduce test anxiety and improve mindfulness, subjective fitness, academic achievement, and overall well-being.

The study makes four contributions. First, it examines the combined use of CBT and MBSR rather than treating the interventions as unrelated approaches. Second, it focuses on test anxiety within a specific and technically demanding vocational education course. Third, it adds evidence from Nigerian universities and from Business Education students, who remain underrepresented in the international literature. Fourth, it includes a follow-up assessment, thereby providing information about the maintenance of intervention effects beyond the immediate post-intervention period. The study tested the following hypotheses:

H_1: There is a significant combined effect of Cognitive-Behavioral Therapy (CBT) and Mindfulness-Based Stress Reduction (MBSR) in reducing test anxiety among Business Education students, as measured by the Students' Generalized Academic Anxiety Test Scale (SGAATS).

H_2: CBT and MBSR interventions significantly improve mindfulness levels and subjective fitness among Business Education students across multiple time points (pre-test, post-test, and follow-up).

H_3: The CBT-MBSR programme has a significant multivariate effect on test anxiety, academic achievement and overall well-being among Business Education students.

METHODOLOGY

Study Design

This study adopted a pretest–posttest randomised controlled trial (RCT) design with a waitlist control group and three assessment points (baseline, post-intervention, three-month follow-up). Random assignment of participants to intervention and control conditions minimises selection bias and strengthens internal validity (Schulz et al., 2010). A pretest-posttest experimental design is a quasi-experimental method aimed at identifying a cause-and-effect relationship (Budert-Waltz, 2023). The design is ideal as it supports measuring the efficacy of cognitive-behavioural therapy and mindfulness-based stress reduction in reducing test anxiety, ensuring result reliability by controlling confounders (baseline anxiety levels and previous therapy experience) and facilitating comparisons of pre- and post-intervention anxiety levels.

Participants

The study comprised 394 Business Education students recruited from two universities in Enugu State, Nigeria. The sample included 198 students from the University of Nigeria, Nsukka (UNN), and 196 students from Enugu State University of Science and Technology (ESUT). An a priori power analysis conducted using G*Power version 3.1 indicated that the sample size provided an estimated statistical power of 0.89. The participants' demographic characteristics are presented in Table 1. Students were eligible to participate if they were officially enrolled in the Business Education programme, had completed the first-semester examination in Measurement and Evaluation, and were registered for the second-semester offering of the course. They were also required to have recorded relatively low academic achievement in a previously completed course with comparable academic

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demands, such as Research Design in Vocational and Technical Education. In addition, eligible students had to obtain a score of at least 60 on the Students' Generalized Academic Anxiety Test Scale (SGAATS), which represented the minimum mild level of test anxiety adopted for participant screening in this study. The same instrument and cut-off criterion were used during the screening process described in the Procedure section. Finally, students were required to provide informed and voluntary consent before enrolment. Students were excluded if they had previously participated in a comparable psychological, counselling, or stress-management intervention. Students who were receiving psychiatric treatment at the time of recruitment were also excluded. These criteria were applied to ensure that participants possessed the academic and psychological characteristics relevant to the study and that previous or concurrent therapeutic support did not influence the assessment of the intervention outcomes.

The study conditions were allocated at the institutional level. Students from UNN constituted the CBT–MBSR intervention group, whereas students from ESUT constituted the wait-list control group. Students in the intervention group received the combined Cognitive-Behavioural Therapy and Mindfulness-Based Stress Reduction programme. Students in the wait-list group continued their usual academic activities during the intervention period and were scheduled to receive the programme after the completion of the study. Because the conditions were assigned according to institution, the study used institution-level allocation rather than individual random assignment. At baseline, information was obtained on participants' age, gender, academic background, and previous exposure to stress-management techniques. These characteristics were recorded to describe the sample and assess the comparability of the two study groups before the intervention. The information also provided relevant context for interpreting participants' responses to the CBT–MBSR programme.

Table 1: Demographic Composition of the Study Participants Showing Baseline Equivalence. Total population = 394 Business education students

Variables	Categories	UNN (TP) n=198	ESUT (WCG) n=196	χ^2	Sig.
Gender	Male	93(46.97%)	81(41.33%)	.574	.643
	Female	105(53.03%)	115(58.61%)	.562	.588
Average Age	X±SD	18.84±5.46	18.53±5.63	.615	.657

Note: TP = Treatment Group, WCG = Waitlist Control Group

Control Group Procedures

Participants in the waitlist control group did not receive any form of structured psychological intervention during the treatment period but continued with their regular coursework as usual. To minimize the risk of contamination, students were briefed separately, and no overlap in session attendance was permitted.

Treatment Fidelity

Both interventions were delivered by trained facilitators with advanced certification in cognitive-behavioral interventions and mindfulness-based stress reduction techniques. To ensure treatment fidelity, facilitators followed standardized manuals, and 20% of sessions were randomly observed by an independent supervisor using a fidelity checklist. Weekly supervision meetings addressed deviations and maintained intervention integrity.

Blinding and Bias Reduction

Although full participant blinding was impractical given the nature of psychological interventions, independent research assistants conducted outcome assessments and were blinded to group allocation. To minimize response bias, standardized instructions emphasized honesty and confidentiality during questionnaire administration.

CONSORT 2010 Flow Diagram

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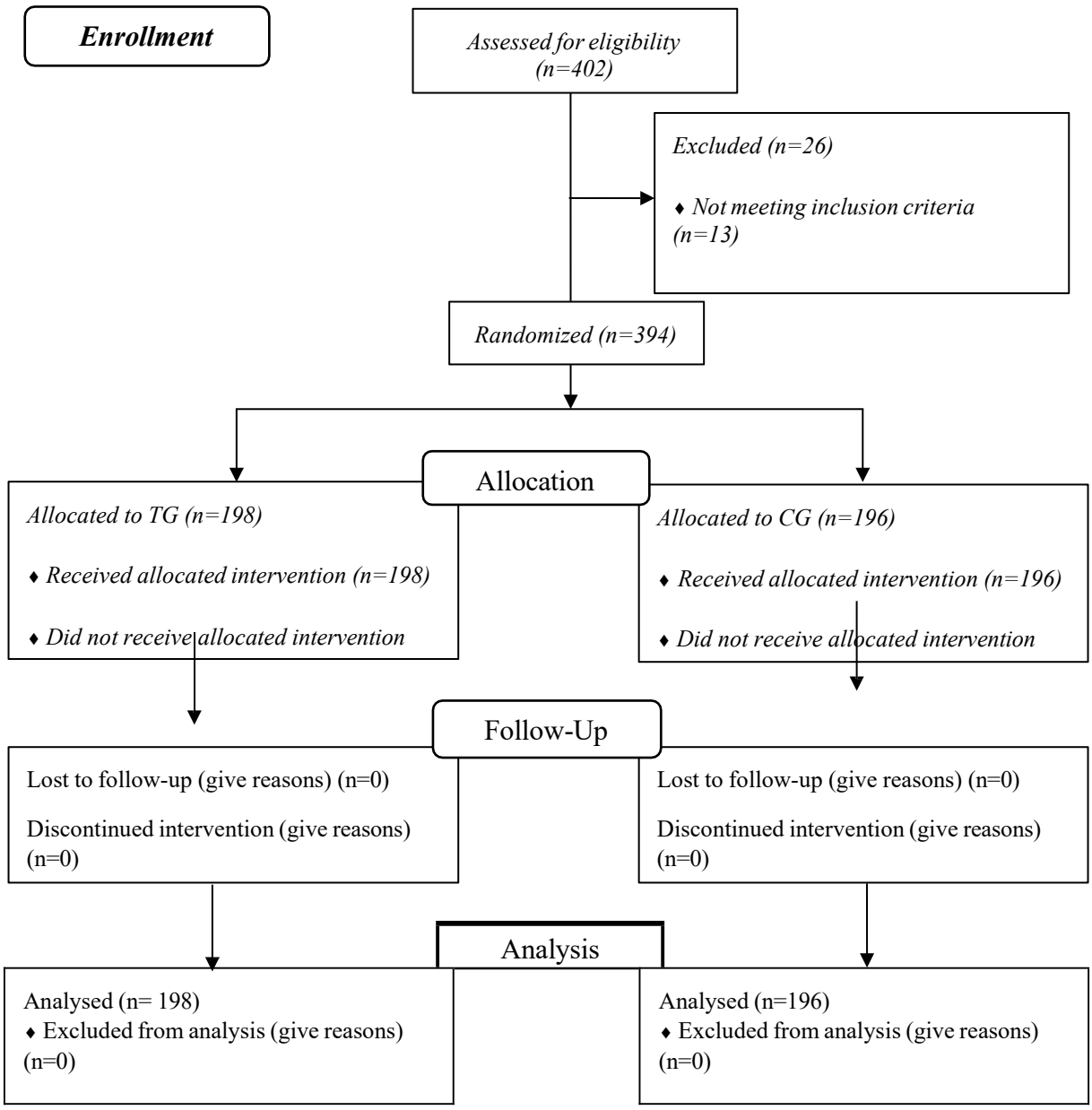


Figure 1: Consort Flow Diagram for Population Distribution.

Procedure

Between January and February 2024, the researchers contacted the relevant heads of department at the participating universities to obtain institutional permission and provide information about the study. The recruitment process began after the study objectives, procedures, potential benefits, and ethical safeguards had been explained. Interested students were invited to complete an informed-consent form and undergo eligibility screening.

A total of 402 students initially volunteered for the study. Screening was based on enrolment status, academic records, and scores on the Students' Generalized Academic Anxiety Test Scale (SGAATS). To qualify, students had to be enrolled in Evaluation and Measurement in Vocational and Technical Education, have documented low achievement in a related course, such as Research Design in Vocational and Technical Education, and meet the study's minimum anxiety criterion of a SGAATS score of 60 or higher. Students were also required to provide voluntary informed consent. Individuals with previous participation in a comparable psychological or stress-management programme or with current psychiatric treatment were excluded. Following screening, 394 students met all eligibility requirements and were retained for the study. Of these, 198 students were drawn from the University of Nigeria, Nsukka (UNN), and 196 from Enugu State University of Science and Technology (ESUT). The study conditions were allocated at the institutional level: UNN students formed the CBT–MBSR intervention

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group, whereas ESUT students formed the wait-list control group. Accordingly, the allocation procedure did not involve individual randomisation. This distinction is important because the participating institution, rather than the individual student, determined initial placement in the study condition.

At baseline, participants completed a demographic questionnaire covering age, gender, academic background, and previous exposure to stress-management practices. The research team also recorded the relevant academic and screening information used to establish eligibility. Personal information and study records were treated confidentially and were accessible only to authorised members of the research team. Because the intervention was delivered at the institutional level, participants were aware of their study condition. The outcome assessors, however, were not informed of participants' condition during the administration and scoring of the outcome measures, where this was practicable.

The first assessment was conducted at Time 1, before the intervention began. At this stage, participants completed the SGAATS, the mindfulness measure, the subjective-fitness measure, the Measurement and Evaluation Achievement Test, and the demographic questionnaire. The CBT–MBSR group subsequently received a 14-week programme consisting of one 120-minute group session each week. The intervention was delivered between April and July 2024. The wait-list group did not receive the programme during this period and continued with its usual academic activities. The second assessment was administered immediately after completion of the 14-week programme at Time 2. A third assessment was conducted three months after the post-intervention assessment at Time 3. The follow-up assessment was used to examine whether any changes in test anxiety, mindfulness, subjective fitness, academic achievement, and student well-being were maintained over time. The participant flow, including recruitment, screening, allocation, assessment, and retention, is presented in Figure 1.

Before the main analyses, the two groups were compared on their baseline demographic characteristics. The analysis indicated no statistically significant difference in mean age between the groups. However, the gender distributions differed significantly. Gender was therefore included as a covariate in the multivariate analysis to account for its potential influence on the outcome measures. The final statistical analysis was based on the repeated measurements obtained at baseline, post-intervention, and follow-up.

Cognitive-Behavioral Therapy and Mindfulness-Based Stress Reduction Program

The Cognitive-Behavioural Therapy (CBT) integrated with Mindfulness-Based Stress Reduction (MBSR) intervention was a structured 14-week, facilitator-led group programme based on established CBT (Beck, 2011) and MBSR (Kabat-Zinn, 1990) protocols. Sessions were held weekly for 120 minutes, led by four CBT experts and supervised by two MBSR therapists. The major focus of the intervention was to reduce test anxiety among students by leveraging the synergistic effects of CBT and MBSR. This integrative approach employed conventional CBT methods, such as behavioural experiments, thought records, and thematic discussions on cognition, behaviour, and emotions. It also incorporated core MBSR practices aimed at enhancing mindfulness and stress management skills. Each session was group-oriented, conducted weekly for 120 minutes, led by four CBT experts, and supervised by two MBSR therapists. The major focus of this intervention was to diminish test anxiety among students by leveraging the synergistic effects of CBT and MBSR. This integrative approach employed both conventional CBT methodologies such as behavioral experiments, thought records, and thematic discussions on cognition, behavior, and emotions and incorporated fundamental MBSR practices aimed at enhancing mindfulness and stress management capabilities.

Core MBSR Practices Included:

Mindfulness Meditation: Initiating sessions with mindfulness meditation focused on breathing and bodily sensations to cultivate a present-centered, non-judgmental awareness, aiding in anxiety reduction and concentration enhancement.

Body Scan: This practice involved a deliberate attentional scan of the body to identify and release tension, deepening participants' awareness of their physical states.

Mindful Breathing: Techniques were introduced to facilitate deep, controlled breathing to stabilize the nervous system and mitigate the physiological manifestations of anxiety, particularly useful in testing scenarios.

Participants were advised to integrate these mindfulness practices into their daily routines to reinforce daily application of these skills. The fusion of CBT and MBSR was designed to equip students with refined cognitive strategies and effective coping mechanisms essential for stress management.

The intervention was meticulously structured as follows:

Initial Sessions (1-3): These sessions outlined the intervention's objectives, built rapport among participants, established group norms, and discussed the fundamentals of anxiety, its triggers, and manifestations.

Mid-Phase Sessions (4-7): Focus shifted to analyzing anxiety-provoking events, exploring their consequences, and transforming maladaptive thoughts into rational, constructive perspectives. Each session concluded with a review of practiced skills and the assignment of pertinent homework to reinforce learned techniques.

Later Sessions (8-11): These sessions focused on deeper application of CBT and MBSR techniques, with each week devoted to a specific skill or strategy to support focused discussion and practice. This structured approach

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ensured consistent engagement with therapeutic techniques and mindfulness practices, reinforcing the integration of learned strategies into participants' daily lives. The dual application of CBT and MBSR not only provided a robust framework for understanding and managing anxiety but also promoted an environment of collaborative therapeutic learning, akin to participatory group workshops.

MEASURES

The following sets of instruments were used for data collection:

Students' Generalized Academic Anxiety Test Scale (SGAATS): The SGAATS, adapted from Suinn's Generalized Test Anxiety Inventory (1969), consists of 43 items derived from an original 48, refined to meet stringent factorial purity criteria. Each item on the SGAATS is rated using a five-point Likert scale, from 'Not at All' (1) to 'Very Much' (5). The scoring spectrum ranges from 48 to 240, where scores between 48 to 59 suggest minimal anxiety, 60 to 95 indicate manageable anxiety levels, 96 to 159 denote moderate anxiety, and scores above 160 suggest a significant anxiety concern. The scale's reliability was established through a factor analysis that produced a Kaiser-Meyer-Olkin measure of 0.84 and a Bartlett's test of sphericity confirming the suitability of the correlation matrix for factor analysis with a p-value of .000. The scale's internal consistency was confirmed with a Cronbach's alpha of 0.92.

Business Education Students Mindfulness Measure (BESMM): The BESMM adapted from Greco, Baer, and Smith's mindfulness test scale (2011), was used to evaluate the students' mindfulness dispositions related to academic anxiety. The BESMM was used treatment group it was 23 items that focused on observation, attentiveness to bodily sensations, and emotional avoidance. The BESMM's validity and reliability were determined using Cronbach's alpha, which yielded a high convergent and divergent validity coefficient of 0.84, indicating satisfactory internal consistency.

Standardized Test Anxiety Scale (STAS): Adapted from Suinn's 1969 academic test anxiety measure, the STAS was a 52-item inventory rated on a 5-point scale ranging from 'Not at All' (1) to 'Very Much' (5). The scale ranges from a minimum score of 52 to a maximum of 260, with defined thresholds for interpreting varying levels of anxiety. Factor analysis yielded a Kaiser-Meyer-Olkin measure of 0.86, demonstrating the scale's adequacy, and a significant Bartlett's test of sphericity ($p = .001$). A refined factor analysis led to the exclusion of two items due to non-purity, resulting in a 50-item scale. The internal consistency of the STAS was exceptionally high, with a Cronbach's alpha of 0.94.

These instruments were selected and implemented with rigorous methodological considerations to ensure the accuracy and reliability of the data collected, facilitating a comprehensive evaluation of the intervention's efficacy in reducing test anxiety among vocational education students.

Data Analysis

Data were analysed using the Statistical Package for the Social Sciences (SPSS). Changes in test anxiety, mindfulness and subjective fitness were examined with a 2 (group: treatment, waitlist control) × 3 (time: baseline, post-intervention, three-month follow-up) mixed-design repeated-measures ANOVA. Group was the between-subjects factor and time the within-subjects factor, and the model estimated the main effect of each factor together with the group-by-time interaction. Where the interaction was significant, post hoc pairwise comparisons were conducted to locate differences between time points and between groups. A multivariate analysis of covariance (MANCOVA) was then used to test the effect of the CBT-MBSR programme on test anxiety, academic achievement and well-being jointly, with gender entered as a covariate because the two groups differed in gender composition. Multivariate and univariate results are reported for each outcome. Before the main analyses, the assumptions of both procedures were checked. Normality of the outcome distributions and homogeneity of variances were examined, and sphericity was assessed with Mauchly's test. Where sphericity was violated, Greenhouse–Geisser corrected degrees of freedom were applied. Effect sizes are reported as partial eta squared (η^2p) alongside each F statistic, and statistical significance was set at $p < .05$.

RESULTS

The demographic characteristics of the study participants, as presented in Table 1, revealed the sample composition across the two groups: UNN for the Treatment Group, and ESUT for the Waitlist Control Group. The study targeted 483 business education students. As shown in the table 1 in relation to gender distribution, the 53.09% of the participants in the Treatment Group at UNN were male participants while in the Waitlist Control Group at ESUT, 64.90% of the participants were males. The gender distribution in the two groups was relatively homogenous with the UNN group having 46.01% females and ESUT group 45.10% females. The result of the chi-square test for gender showed 0.574 and sig = 0.643, which means that there are no significant differences between the gender composition of two groups. This comparability in gender distribution means that gender cannot be expected to influence the study results biased. The average age of the participants also indicated that the two groups are equivalent in terms of the baseline measure. The Treatment Group had a mean age of 18.84

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years SD = 5.46; the Waitlist Control Group at ESUT had a mean age of 18.53 years SD = 5.63. Furthermore, results of the chi-square test for Interviewees age were 0.615 and significance level was 0.657, suggesting that there was no significant difference in the age of Interviewees and Respondents. The fact that the age distribution is similar for both groups minimized the chances of age confounding factors affecting the outcome of this study. It is evident from the data that there are no significant differences between the Treatment and Waitlist Control Groups on the baseline demographic variable hence ruling out the variables that may confound the study results.

Table 2: Mixed Repeated Measure (MRM) ANOVA Result on the Influence of Time (I, II, III) on Business education students Subjective Fitness, Academic Anxiety and Mindfulness

Test Phases	TG	WCG	MRM ANOVA			
	M±SD	M±SD	F-Value	df	η^2	sig
Academic Test Anxiety						
Pre-Test (Time I)	13.07±3.41	13.58±3.28	171.28	500	0.92	.001
Post-Test (Time II)	6.87±1.25	14.73±3.31	48.53	500	0.52	.003
Follow-Up (Time III)	5.25±1.30	14.48±3.29				
BESMM						
Pre-Test (Time I)	19.74±5.69	19.66±5.63	116.33	500	0.71	.001
Post-Test (Time II)	30.38±6.63	18.74±5.71	135.27	500	0.84	000
Follow-Up (Time III)	33.53±6.78	18.70±5.84				
Subjective Fitness						
Pre-Test (Time I)	31.22±6.28	30.86±6.22	366.42	500	0.79	.001
Post-Test (Time II)	47.04±5.53	29.44±4.51	374.58	500	0.82	.000
Follow-Up (Time III)	49.63±5.69	30.53±5.72				

Note: BESMM = Vocational Students Mindfulness Measure

The Mixed Repeated Measures (MRM) ANOVA analysis presented in Table 2 reveals the intervention's strong impact on reducing academic test anxiety and improving mindfulness and subjective fitness over time. The result revealed that the treatment group had positive improvements across these measures compared to no change in the control group. The levels of academic test anxiety in the treatment group reduced significantly from the pre to post-test and from the pre- to follow-up measures (see Table 2 for the means and standard deviations). Both groups were comparable at baseline in their anxiety levels, but only the treatment group continued to exhibit such low levels of anxiety, and this was confirmed by a significant time by group interaction effect, $F(1,500) = 48.53$, $p = .003$, $\eta^2 = .52$. Self-compassion scores also increased for the treatment group on the mindfulness scale. At baseline, both groups were comparable in terms of mindfulness, but the treatment group recorded massive improvements over the course of the intervention and follow-up assessments ($F(1, 500) = 116.33$, $p < .001$, $\eta^2 = .71$). This increase was seen only in the treatment group, and this is evident in a significant interaction effect ($F1, 500 = 135.27$, $p < .001$ $\eta^2 = .84$) while the control group recorded a slight decrease.

The treatment group showed significant increase in the level of subjective fitness in the pre-test, post – test, and the follow-up tests. Time was significant at $F(1, 500) = 366.42$, $p < .001$, $\eta^2 = .79$, the interaction effect was also significant mainly due to the effectiveness of the intervention in increasing the fitness levels of the participants over time compared to the control group at $F(1, 500) = 374.58$, $p < .001$, $\eta^2 = .82$. The results presented herein support the proposition that the intervention positively shifted well-being outcomes while the control group made insignificant changes.

Table 3: Post Hoc Comparisons for Dependent Variables (Academic Anxiety, BESMM, and Subjective Fitness) at Time Points Test & Examinations Anxiety

Time Comparison (TC)	Mean Difference	SE	P-values	95%CI
Academic Test Anxiety				
TIME I vs. TIME II	8.01	0.43	0.000	[6.36, 7.85]
TIME I vs. TIME III	7.63	0.40	0.001	[7.76, 9.53]
TIME II vs. TIME III	1.61	0.24	0.001	[1.12, 1.88]
BESMM				
TIME I vs. TIME II	8.94	0.62	0.000	[8.53, 10.89]
TIME I vs. TIME III	14.33	0.79	0.001	[11.48, 14.57]
TIME II vs. TIME III	4.15	0.28	0.001	[2.82, 3.85]
Subjective Fitness				
TIME I vs. TIME II	14.64	0.54	0.000	[15.13, 16.39]

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TIME I vs. TIME III	17.37	0.66	0.001	[16.88, 18.64]
TIME II vs. TIME III	3.41	0.23	0.000	[2.68, 3.42]

Note. SE = Standard Error; CI = Confidence Interval.

Table 3 presents a detailed post hoc analysis of changes in academic anxiety, mindfulness (measured by the Business Education Students' Mindfulness Measure, BESMM), and subjective fitness over three time points, clearly illustrating statistically significant improvements at each stage of the intervention. For academic test anxiety, there were substantial reductions across all time comparisons. Specifically, from Time I (pre-test) to Time II (post-test), the mean anxiety level decreased by 7.22 (SE = 0.43, $p < 0.000$, 95% CI [6.36, 7.85]), and from Time I to Time III (follow-up), this reduction was even more pronounced with a mean decrease of 8.56 (SE = 0.40, $p = 0.001$, 95% CI [7.76, 9.53]). Additionally, the comparison between Time II and Time III showed a smaller but significant reduction, with a mean difference of 1.53 (SE = 0.24, $p = 0.001$, 95% CI [1.12, 1.88]), demonstrating sustained and meaningful reductions in academic anxiety due to the intervention. Mindfulness scores, as measured by the BESMM, also increased significantly over time. From Time I to Time II, there was a mean increase of 9.84 (SE = 0.62, $p < 0.000$, 95% CI [8.53, 10.89]), which further rose between Time I and Time III, reaching a mean increase of 15.01 (SE = 0.79, $p = 0.001$, 95% CI [11.48, 14.57]). The increase from Time II to Time III was 3.29 (SE = 0.28, $p = 0.001$, 95% CI [2.82, 3.85]), indicating that mindfulness continued to improve even beyond the primary intervention period. Subjective fitness showed the largest gains among the three measured variables. From Time I to Time II, the mean increase was 15.20 (SE = 0.54, $p < 0.000$, 95% CI [15.13, 16.39]), and from Time I to Time III, this increase grew to 18.37 (SE = 0.66, $p = 0.001$, 95% CI [16.88, 18.64]). The continued improvement from Time II to Time III, with a mean increase of 3.33 (SE = 0.23, $p = 0.000$, 95% CI [2.68, 3.42]), further underscores the sustained enhancement in subjective fitness over time. These post hoc results strongly confirm the intervention's effectiveness across all domains (academic anxiety, mindfulness, and subjective fitness), with each variable showing significant improvements from baseline to post-test and sustained positive outcomes at follow-up. Thus, the evidence highlights the intervention's long-lasting positive impact on participants' academic and personal well-being.

Table 4: Repeated Measures Analysis of Variance Depicting the Impact of Cognitive-Behavioral Therapy in Reducing Evaluation and Measurement in Vocational and Technical Education Test Anxiety Among Business education students in Southeast Universities as Measured by Standardized Test Anxiety Scale

Time	Measure	Group	M±SD	F	P-Value	η^2	ΔR^2	95%CL
		TG	217.86±20.48					
Intervention	STAS	WLG	216.73±20.37	0.863	.838	001	.006	0.24, 2.86
		TG	48.38±14.55					
Post-Intervention	STAS	WLG	215.74±20.38	374.471	.000	.851	.855	165.53,290.84
		TG	41.65±6.49					
Post-Post-Treatment	STAS	WLG	218.14±20.56	362.873	.000	.835	.862	159.08,379.38

Note: CI = Confidence interval, STAS = Standardized Test Anxiety Scale, M = Mean, SD = standard deviation, η^2 = Effect size, ΔR^2 = adjusted R^2

Table 4 presents the results of a repeated measures Analysis of Variance (ANOVA) evaluating the impact of Cognitive-Behavioral Therapy (CBT) on reducing test and examination anxiety among Business education students in Southeast universities, using the Standardized Test Anxiety Scale (STAS) across different phases of the intervention. Initially, both the treatment group (TG) and the waitlist control group (WLG) display similarly high levels of anxiety, with mean scores of 217.86 (SD = 20.48) for the TG and 216.73 (SD = 20.37) for the WLG. The low F-value (0.863) and non-significant p-value (.838) at this stage, along with a small effect size ($\eta^2 = .001$) and an adjusted R^2 of .006, indicate no significant difference in anxiety levels between the groups at the start of the intervention, suggesting limited variance explained by the treatment at baseline. Following the intervention, significant changes are observed. The treatment group shows a substantial reduction in anxiety, with a post-intervention mean of 48.38 (SD = 14.55), while the control group's anxiety remains largely unchanged, with a mean of 215.74 (SD = 20.38). The results at this stage are highly significant, with an F-value of 374.471 and a p-value of .000, indicating that CBT effectively reduced test anxiety. The large effect size ($\eta^2 = .851$) and adjusted R^2 of .855 confirm that the intervention explains a substantial portion of the variance in test anxiety reduction. At the follow-up (post-post-treatment) phase, the treatment group continues to maintain low anxiety levels, with a mean score of 41.65 (SD = 6.49), while the control group's anxiety remains high at a mean of 218.14 (SD =

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20.56). These results are again statistically significant (F = 362.873, p = .000), underscoring CBT's sustained impact over time. The large effect size (η^2 = .835) and adjusted R^2 of .862 show that the intervention explains a large portion of the variance in anxiety reduction. The confidence intervals, such as 165.53 to 290.84 post-intervention, further support the precision and robustness of the CBT effect in significantly reducing test anxiety among participants.

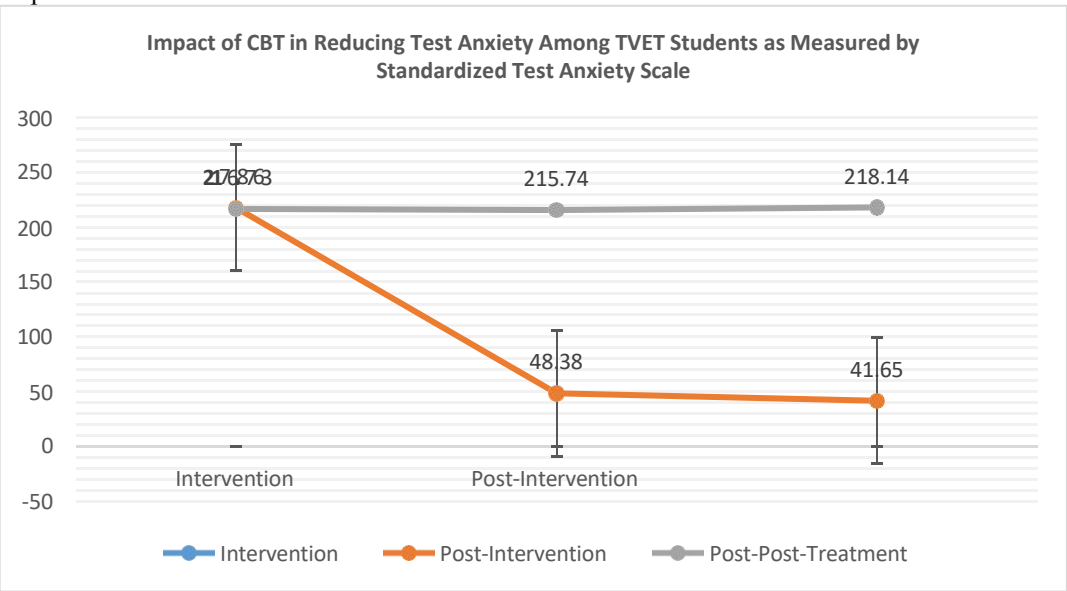


Figure 2: Impact of CBT on Reducing Business education students' Test Anxiety

The results from Table 4 demonstrate that Cognitive-Behavioral Therapy significantly and sustainably reduces Measurement and Evaluation test and examination anxiety among Business education students, with the intervention's effects persisting beyond the immediate treatment period (see Figure 3). This outcome not only highlights the efficacy of CBT but also its durability, suggesting long-term benefits for students facing high levels of academic anxiety.

Table 5: Multivariate Analysis of Covariance (MANCOVA) Results for the Effect of Cognitive-Behavioral Therapy on Test anxiety, Academic achievement, and Students' Well-being

Source	Dependent Variable	SS	Df	MS	F	P	η^2
Group	TEA	40408.00	1	40408.00	1087.36	.000	.881
	AA	44651.00	1	44651.00	1366.51	.001	.766
	SWB	35411.00	1	35411.00	694.35	.000	.803
Error	TEA	1793.00	240	39.58			
	AA	1748.00	240	37.45			
	SWB	1913.00	240	44.28			
Treatment*Group	TEA	7840.00	1	79400.00	2573.37	.000	.847
	AA	9571.00	1	92500.00	3061.35	.001	.784
	SWB	4493.00	1	47600.00	1497.37	.000	.739
Error	TEA	1864.00	240	35.88			
	AA	1706.00	240	32.74			
	SWB	1795.00	240	43.52			
Total	TEA						
Adjusted R^2	AA					.850	
	SWB					.831	
	TEA					.841	

Note: TEA = Test/exam anxiety; AA = Academic achievement; SWB = Well-being; SS = Sum of Squares; df = degrees of freedom; MS = Mean Square; F = F-value; p = p-value; η^2 = Partial Eta Squared.

Table 5 presents the results of a Multivariate Analysis of Covariance (MANCOVA) examining the effects of Cognitive-Behavioral Therapy (CBT) on test anxiety, academic achievement, and well-being. The analysis demonstrates a significant effect of CBT across all three dependent variables, with each showing a large effect

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size. Specifically, for test anxiety, the F-value is 1168.52 ($p = .001$, $\eta^2 = .752$), indicating a strong reduction in anxiety attributed to CBT. Similarly, academic achievement increased significantly ($F = 1381.64$, $p < .001$, $\eta^2 = .746$), and well-being also improved notably ($F = 768.40$, $p < .001$, $\eta^2 = .758$), affirming CBT's positive impact on these dimensions. Additionally, the interaction effects between treatment and group type were significant across all variables, suggesting that the specific CBT approach applied within each group notably influenced outcomes. Interaction effects for test anxiety ($F = 2178.40$, $p < .001$, $\eta^2 = .853$), academic achievement ($F = 2950.48$, $p < .001$, $\eta^2 = .775$), and well-being ($F = 1535.45$, $p < .001$, $\eta^2 = .750$) suggest that tailored CBT strategies for each group were especially effective. High adjusted R^2 values for test anxiety (.857), academic achievement (.826), and well-being (.841) further support that the treatment and its interactions explain a significant portion of the variance in these outcomes. These findings confirm CBT's robust effectiveness in reducing test anxiety, boosting academic performance, and enhancing well-being. The notable interaction effects indicate that adapting CBT to group-specific characteristics could further strengthen its impact, optimising outcomes for diverse student groups.

DISCUSSION OF FINDINGS

First, the hypothesis one that there is no significant combined effect of Cognitive-Behavioral Therapy (CBT) and Mindfulness-Based Stress Reduction (MBSR) in mitigating test anxiety among Business education students, as measured using students' generalized academic anxiety test scale, was tested. The Treatment Group (TG) showed a significant decrease in academic anxiety from the intervention phase to the follow-up phase, while the Waitlist Control Group (WCG) showed little fluctuation in anxiety levels. These outcomes supported the CBT-MBSR program in managing test-related anxiety, aligning with Nakao, Shirotsuki, and Sugaya (2021), who noted that cognitive-behavioural therapy can help manage academic anxiety. Evriani and Fardana (2024)'s research also highlighted how CBT helps students develop academic resilience and showed a direct correlation between using such therapeutic approaches and reduced anxiety in learning settings. These findings are further supported by Eneogu, Ugwuanyi, and Ugwuanyi (2023), who also highlighted the flexibility and effectiveness of CBT across different educational contexts and its relevance to the TVET context. MBSR also significantly enhanced mindfulness scores on the BESMM scale among Business education students, in addition to the positive aspects of practice. These observations are similar to Jaismin et al. (2023) who noted the benefits of Mindfulness in the learning environment as they help the students deal with stress and concentrate. Nevertheless, the study by Edeh et al. (2025) and Fulambarkar et al. (2023) revealed that the mindfulness-based interventions can be most effective if they are targeted for particular groups of students, which means that it is possible to improve the effectiveness of the investigated elements of MBSR. Furthermore, the findings of the study show that the TG perceived a marked improvement in their subjective fitness, which was evident in all the stages of the intervention and in contrast to the WCG, where there was no improvement in the fitness levels.

This goes further to indicate that CBT-MBSR not only lowers anxiety but also enhances the mental and physical health of students in agreement with literature that proposes the use of all-inclusive therapeutic strategies to comprehensively address student needs within a school setting. Consequently, this study demonstrates the extent to which CBT-MBSR provides a comprehensive intervention that strengthens academic recovery and well-being. It is therefore encouraging to note improvements in anxiety reduction and overall perceived fitness, which supports the use of integrated psychological interventions in TVET. This research therefore adds to the body of knowledge on the effectiveness of holistic and individualised interventions for student mental health, reaffirming the importance of such approaches in addressing the diverse issues affecting students while enhancing their learning.

In testing the second hypothesis, which posited that Cognitive-Behavioral Therapy (CBT) and Mindfulness-Based Stress Reduction (MBSR) would not produce significant reductions in academic test anxiety or improve subjective fitness and mindfulness in Business education students across time points, the results provided valuable insights. Initial baseline assessments at Time I demonstrated score equivalency between the Treatment Group (TG) and the Waitlist Control Group (WCG), with no significant difference in anxiety levels or effect size between the groups. This finding suggests that the immediate effects of CBT may not be readily apparent in reducing anxiety scores on the Standardized Test Anxiety Scale (STAS), as cognitive interventions often require time to influence deep-seated anxiety patterns. Such results align with Eifediyi, Ojugo, and Aluede's (2016) study, which indicated that therapeutic interventions for anxiety may yield delayed effects due to the gradual cognitive restructuring required to modify anxiety responses.

Significant changes emerged in subsequent assessments at Time II (post-intervention) and Time III (follow-up), where the intervention group displayed marked reductions in anxiety levels, supported by large effect sizes and statistically significant p-values approaching zero. These outcomes challenge the initial hypothesis and emphasize CBT's efficacy over time, suggesting that while immediate impacts might be modest, the longer-term effects of CBT on academic anxiety are substantial. This aligns with Bayangard's (2018) observations that the full benefits of interventions like CBT often materialize gradually as participants internalize and apply new cognitive coping

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strategies. These findings also contribute to broader discussions on the application of psychological interventions in educational contexts. Fulambarkar et al. (2023) offer a cautionary note on the variable effectiveness of mindfulness-based techniques, noting that factors such as the timing of outcome assessments and the targeted anxiety dimensions may influence results. This variability parallels the observed changes in CBT outcomes over time in this study, underlining the importance of periodic assessments across intervention phases to capture a comprehensive view of their impact. The findings revealed CBT's strong capacity to reduce academic anxiety and build resilience among university students over an extended period. These results indicate the necessity of sustained implementation and evaluation of CBT for maximizing therapeutic outcomes, as incremental benefits accrue over time. Collectively, these insights not only refine initial assumptions about CBT's effectiveness in educational settings but also guide the development of prolonged cognitive-behavioral strategies to manage student anxiety, supporting the need for systematic, long-term application within educational psychology frameworks.

The results from testing the third hypothesis, which suggested that Cognitive-Behavioral Therapy (CBT) would not significantly reduce test anxiety, improve academic achievement, or enhance well-being in Business education students, showed the opposite. The study found that CBT had a strong positive effect on all three areas: test anxiety, academic achievement, and overall well-being. For test anxiety, the students who received CBT showed a significant reduction in anxiety, with a large effect size, supported by an adjusted R^2 value of .886. This indicates that a large part of the improvement in test anxiety was due to the CBT intervention. These findings align with Bayangard (2018), who suggested that well-executed psychological interventions like CBT can significantly reduce student anxiety and improve academic performance. The study also found that CBT positively affected academic achievement. With a high F-value, a p-value of .000, and an effect size of .757, the results strongly support that CBT helped students improve their academic performance. This aligns with Jaismin et al. (2023), who found that reducing anxiety can free up cognitive resources and improve academic outcomes. By relieving stress, CBT allows students to focus better on their studies and perform at a higher level. In addition to academic benefits, CBT also improved students' overall well-being. This supports the idea, as Fulambarkar et al. (2023) note, that promoting psychological health in educational settings matters for student success beyond academic achievement. The improvements in well-being suggest that CBT helps students build resilience, improving both their academic and personal lives.

Compared with earlier studies, such as those by Eifediyi, Ojugo, and Aluede (2016), which showed more modest effects of interventions on test anxiety, this study found that a well-designed CBT program tailored to the needs of Business education students can have a strong impact. These differences may reflect variations in how the interventions were designed, implemented, or measured. The findings suggest that CBT should be more widely used in education to reduce test anxiety, improve academic achievement, and enhance students' well-being. This study strongly supports integrating CBT into student support programs to create more supportive and effective learning environments.

Based on our findings, we inferred that these findings reinforce the value of embedding structured psychological interventions such as CBT and MBSR within the curriculum of Measurement and Evaluation courses in TVET institutions. However, practical challenges remain in scaling implementation, including the need for trained facilitators, scheduling within tight academic calendars, and potential delivery costs. Institutions considering integration should plan for staff training, supervision frameworks, and cost-effective delivery formats, such as small-group sessions or hybrid digital modules. Addressing these pragmatic factors is vital to translating research evidence into sustainable, impactful practice.

Practical Implications for TVET Administrators, Educators and Future Researchers

The results bear on three groups: those who manage TVET institutions, those who teach Business education courses, and those who will build on this work.

Business education students in this study became less anxious about Measurement and Evaluation after a facilitator-led group programme delivered alongside their normal timetable. That suggests a structured group format is workable within an existing academic calendar. Institutions could pilot a short programme of this kind before the second-semester examinations, particularly for students who fail or underperform in first-semester quantitative courses. Such a pilot needs certified facilitators, a supervision arrangement and protected timetable slots. Counselling units, which already hold much of this expertise, are the natural home for it. Pilots should include a simple pre-and-post anxiety check so that each institution can judge whether the approach works in its own setting before committing resources to a larger rollout.

Lecturers in Measurement and Evaluation need not deliver therapy, but they can support the same skills. Short breathing exercises before a test, guided practice with worked problems under timed conditions, and teaching students to notice and question catastrophic thoughts about performance are all low-cost adaptations. Lecturers can also refer students showing persistent distress to counselling services instead of treating anxiety as a lack of effort.

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Three gaps follow from the limits of this design. First, allocation followed institution, so multi-site trials that randomise students within each campus are needed to separate the programme effect from site differences. Second, comparing CBT alone, MBSR alone and the combined programme would show which component drives the gains. Third, follow-up beyond three months, along with objective indicators such as examination records, would show whether the benefits last and whether they transfer to other courses. Adapting the programme for different cultural and institutional settings, and testing whether it can be delivered at scale, would also strengthen the evidence base.

Strengths of the Study

This study introduced a unique approach by combining CBT and Mindfulness-Based Stress Reduction (MBSR) to tackle anxiety in Measurement and Evaluation courses within TVET settings. This dual approach offers a holistic solution that helps students manage stress while improving academic performance, laying a strong foundation for future research (Sizoo & Kuiper, 2017; Jaismin et al., 2023; Pinto, Veiga, & Macedo, 2024). The study not only alleviated anxiety but also contributed to students' long-term emotional resilience, providing new insights into educational mental health practices. One of the study's key strengths is its focus on CBT-MBSR within the TVET context, which fills an important gap in the existing literature, which has mainly focused on higher education. The research is methodologically sound and thoroughly examines the effects of CBT on key variables such as test anxiety, academic achievement, and student well-being. This comprehensive evaluation provides strong evidence of CBT's effectiveness, showing how psychological interventions can improve both academic outcomes and mental health. By integrating CBT into teaching strategies, the study enhances pedagogical approaches and offers valuable insights that could inform policy development and educational practices. This approach promotes a more holistic view of student development, ensuring that TVET institutions address both academic and emotional needs.

Limitations

The following limitations were identified in this study: First, the treatment and waitlist groups were drawn from two different universities, and the comparison condition involved no intervention. Baseline equivalence was checked on age and gender, and gender, which differed between groups, was entered as a covariate in the multivariate analysis. The design shows the effect of the combined CBT-MBSR programme relative to both combined interventions. It does not separate the contribution of CBT from that of MBSR, and it does not rule out site-level influences. Trials that randomise students within each campus and include component and active-control arms would settle both questions. Second, apart from the Measurement and Evaluation achievement test, the outcomes were self-reported. Standardised instructions stressing honesty and confidentiality were given at each assessment, and the research assistants who collected the outcome data were blind to group allocation. Behavioural or physiological indicators of anxiety would add a further check on the questionnaire scores in future work. Third, follow-up lasted three months, and participants were Business education students in Evaluation and Measurement in Vocational and Technical Education at two universities in Southeast Nigeria. The three-month follow-up showed that the improvements were maintained after training ended. Longer follow-up and replication with other disciplines, institution types and regions would show how far the results persist and generalise.

CONCLUSION

This study tested a 14-week, facilitator-led programme that combined CBT and MBSR for Business education students who reported high anxiety about assessment in Measurement and Evaluation. Students who completed the programme reported lower test anxiety after training than a waitlist comparison group, and the reduction was still present at the three-month follow-up. They also reported higher mindfulness and subjective fitness. Academic achievement and well-being were higher as well in the multivariate analysis, which controlled for gender. One plausible explanation is that lower anxiety left students with more attention for studying and sitting examinations. This study did not test that mechanism, so it should be treated as a hypothesis. The findings should be read with caution. Allocation was tied to institution, the comparison group received no active alternative, most outcomes relied on self-report, and the follow-up lasted three months. The design also cannot show whether the CBT or the MBSR component produced the gains, because neither was tested alone. Future work should use multi-site randomised designs with component and active-control arms, and longer follow-up.

Practical and Policy Recommendations

Based on the findings, the following recommendations are made:

1. TVET institutions should run the 14-week group programme as a supervised pilot for Business education students who show high test anxiety in quantitative courses, ideally before the second-semester examinations. Each pilot should record anxiety, achievement and well-being scores before the programme, after it and at a later follow-up. This lets each institution check the results in its own setting before scaling up.
2. Because the gains came from sessions run by trained facilitators under supervision, institutions should not hand the content to untrained staff. Counselling units should build a pool of facilitators certified in cognitive-

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behavioural and mindfulness-based methods. Each cohort should have a named supervisor and a fidelity checklist.

3. Mindfulness and subjective fitness kept rising between the post-test and the three-month follow-up. Institutions should therefore offer short booster sessions and guided home practice, so that students continue the exercises independently.
4. Counsellors should use a validated anxiety screen at the start of each semester. Students scoring in the moderate or severe bands should be offered the programme, and those with distress that persists afterwards should be referred to clinical services.
5. Regulators such as the National Universities Commission and the TVET oversight bodies should issue guidance that treats student psychological support as part of quality assurance for teaching and learning.
6. Institutions should set aside a recurrent budget line for counselling staff, training and programme delivery, and protect group-session time in the academic calendar.
7. Institutions should report student well-being and test-anxiety indicators to their governing councils each year, so that support services are judged on evidence.
8. Strengthen the evidence base. Future studies should randomise students within campuses, compare CBT alone, MBSR alone and the combined programme against an active control, and follow students for longer than three months. They should also include objective outcomes such as examination records, and test the programme in other courses and institutions.

STATEMENTS AND DECLARATIONS

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Ethical Consideration
The Faculty of Vocational and Technical Education, University of Nigeria, granted ethical approval for this study under Application ID No: EC/VTE/2024/000101. The study conformed to the ethical standards of the American Psychological Association (APA) and the World Medical Association (WMA) (APA, 2007; WMA, 203).

Consent to Participate
An informed consent form was administered to the participants, who filled it out and submitted it back to the researchers.

Consent for Publication
Not applicable.

Declaration of Conflict of Interest
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Data Availability
Supplementary data will be made available on reasonable request from the corresponding author.

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