

Effects of a Brief Guided Meditation Intervention on Stress, Focus, and Emotional Regulation among Engineering Students during Campus Placement Training

Mohan R¹, Evangeline Supriya²

¹M.Sc (Psychology) Student and Corresponding Author, Department of Psychology, Centre for Distance and Online Education, JAIN (Deemed-to-be University), Bengaluru, India

²Assistant Professor, Department of Psychology, Centre for Distance and Online Education, JAIN (Deemed-to-be University), Bengaluru, India

Abstract

Placement training is a high-stakes period for engineering students in which performance evaluation, peer comparison, and career uncertainty are combined in ways not found in routine academic assessment. Whether stress could be reduced and focus and emotional regulation improved among students undergoing placement preparation was examined in this study through a brief, two-week guided meditation intervention. A pre-test-post-test control group design was used, in which a 30-item self-report questionnaire was completed before and after a two-week period by 56 pre-final-year engineering students (control, $n = 27$; experimental, $n = 29$); 20 minutes of guided meditation were practised daily by the experimental group, while no intervention was received by the control group. A statistically significant within-group improvement in focus was shown by the experimental group ($p = .018$), and a significant between-group advantage on gain scores was found ($p = .013$, $d = 0.69$), with a marginal improvement shown in emotional regulation. However, once analysis of covariance (ANCOVA) was used to adjust for pre-existing differences between groups, these effects were not sustained as statistically significant (all $p > .19$). Strongly positive feedback was nonetheless reported by the experimental group, with benefit across relaxation, concentration, and stress management reported by 72 to 86 percent of participants. Cautious, directional support for brief meditation as a low-cost tool for student well-being during placement training is offered by these findings, while the need for larger, longer, and more rigorously controlled trials is underscored before firm conclusions can be drawn.

Keywords: Meditation, Mindfulness, Stress, Focus, Emotional Regulation, Placement Training, Engineering Students

Introduction

Campus placement training occupies a distinctive place in the psychological lives of engineering students. It is different from routine coursework or semester examinations; it combines direct performance evaluation, visible peer comparison, and prolonged uncertainty about employment outcomes, and it has been linked to elevated stress, reduced concentration, and emotional strain during this period (S. Bisai and

R. Chaudhary, 2017; A. Singh and D. Kumar, 2021) [1, 2]. In a large cross-national survey, job or placement uncertainty was cited by nearly half of engineering students in India and Pakistan as a leading source of psychological distress, alongside academic workload and examinations (Engineering Minds Under Pressure, 2025) [3]. If left unaddressed, these pressures may compromise the very outcomes that placement assessments are designed to test, including clear thinking under pressure, emotional composure, and sustained attention.

Meditation has attracted growing empirical interest as a low-cost, non-pharmacological response to this kind of situational stress. According to the transactional model of stress and coping, cognitive appraisal of demanding situations is theorised to be altered by meditation practice, and coping resources are theorised to be expanded, so that subjective stress is reduced (R.S. Lazarus and S. Folkman, 1984) [4]. It has further been suggested that attentional stability is trained by meditation, as a wandering mind is repeatedly redirected back to a chosen focus, a skill that may plausibly transfer to sustained concentration during aptitude tests and interviews (J. Kabat-Zinn, 1990) [5]. The ability to notice and reappraise an emotional reaction before it escalates is proposed to be strengthened by meditation (J.J. Gross, 1998) [6], and attention, emotion, and behaviour have been proposed to draw on a shared, trainable self-regulatory capacity, offering a unifying account of why a single practice might benefit several outcomes at once (R.F. Baumeister and K.D. Vohs, 2007) [7].

Substantial empirical support exists for these mechanisms. Moderate but reliable reductions in stress and anxiety across diverse populations have been reported following meditation programmes in a meta-analysis of randomised trials (M. Goyal et al., 2014) [8], and significant reductions in academic stress and burnout have been reported among university students following structured mindfulness training in more recent trials (S. Chen and X. Qi, 2025; N. Fitria et al., 2023) [9, 10]. Attentional benefits have been observed even after brief exposure: reaction time was improved and physiological arousal was reduced in first-time meditators after a single loving-kindness meditation session (J.C. Basso et al., 2019) [11], and gains in sustained attention following intensive training have been shown to persist, at least partially, years later (A.P. Zanesco et al., 2018) [12]. Reduced stress among college undergraduates has been reported in randomised comparisons of structured meditation programmes against wait-list controls (D. Oman et al., 2008) [13], and efficacy for student stress has been shown in mobile-delivered meditation trials as brief as a few weeks (J. Huberty et al., 2019) [14].

Despite this evidence base, two bodies of literature remain largely unconnected. Students during placement training have rarely been sampled in meditation-intervention research, and meditation has not, to the authors' knowledge, been tested as an intervention in the placement- and employment-stress literature among Indian engineering students. This gap is addressed directly in the present study with a controlled, India-based experimental design situated within the placement-training window itself. It was hypothesised that, relative to a no-intervention control group, a two-week guided meditation programme would (H1) reduce self-reported stress, (H2) improve focus, and (H3) enhance emotional regulation among students undergoing placement preparation.

Method

Participants

Participants were 56 pre-final-year engineering students (age $M = 20.57$ years, $SD = 0.74$, range 19 to 23) who were undergoing placement training at an engineering college in Coimbatore, India. Students were allocated by simple random sampling to an experimental group ($n = 29$; 16 female, 13 male) or a no-

intervention control group (n = 27; 22 female, 5 male). Students aged 20 to 22 years who were participating in placement training were included; students undergoing psychiatric treatment or already practising regular meditation were excluded.

Design

A quantitative, pre-test-post-test control group design was used. The study questionnaire was completed by both groups immediately before and after a two-week study window.

Measures

Stress, focus, and emotional regulation were assessed using a 30-item self-constructed questionnaire comprising three 10-item subscales, each rated on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree); appropriate items were reverse-scored so that higher subscale totals reflected greater stress, greater focus, and better emotional regulation, respectively. Item content was drawn from constructs established in the Perceived Stress Scale (S. Cohen et al., 1983) [15] and the Emotional Regulation Questionnaire (J.J. Gross and O.P. John, 2003) [16], adapted to the placement-training context. Acceptable internal consistency was found for all three subscales on the combined baseline sample (N = 56): Cronbach's alpha was .73 for stress, .71 for focus, and .73 for emotional regulation. A supplementary 5-item feedback scale was completed by the experimental group at post-test to capture subjective response to the intervention.

Procedure

Following institutional permission and informed consent, the baseline questionnaire was completed by both groups. Twenty minutes of guided mindfulness-based meditation were then practised daily for two weeks by the experimental group; no intervention was received by the control group during this period. The same questionnaire was completed again by both groups at the end of the two weeks, with the feedback scale additionally completed by the experimental group. Participation was voluntary, responses were anonymised for analysis, and the meditation programme was subsequently offered to the control group once data collection was complete.

Statistical Analysis

Data were analysed in Python (pandas, SciPy, statsmodels). Within-group change was tested using paired-samples t-tests, and Wilcoxon signed-rank tests were reported alongside, as non-normality was detected in several difference-score distributions (Shapiro-Wilk $p < .05$). Between-group comparison of change was tested using independent-samples t-tests and Mann-Whitney U tests on gain scores. As the groups were found not to be fully equivalent at baseline on stress and focus despite random allocation, analysis of covariance (ANCOVA) was conducted as the primary, baseline-adjusted significance test, with post-test score as the dependent variable, group as the fixed factor, and pre-test score as the covariate. Alpha was set at .05, and Cohen's d was reported as the effect size.

Results

Descriptive statistics for each outcome, by group and time point, are presented in Table 1. A numerical decrease in stress and increases in focus and emotional regulation from pre-test to post-test were shown

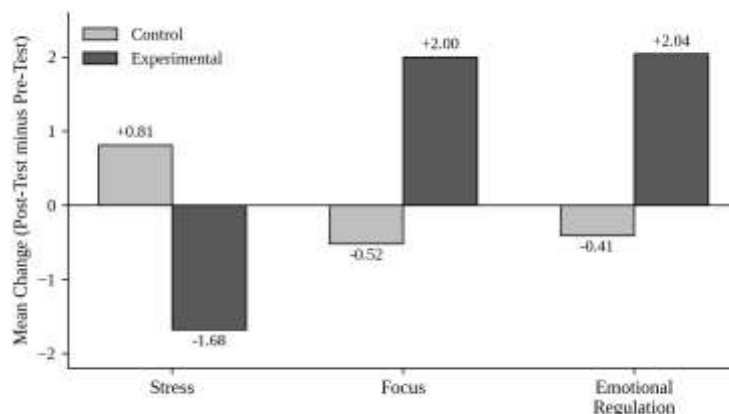
by the experimental group, whereas little change, or change in the opposite direction, was shown by the control group's scores.

Table 1: Descriptive Statistics for Stress, Focus, and Emotional Regulation at Pre-Test and Post-Test

Variable	Group	Pre-Test M (SD)	Post-Test M (SD)	Mean Change
Stress	Control (n = 27)	30.07 (5.26)	30.89 (4.67)	+0.81
	Experimental (n = 28)	33.11 (3.94)	31.43 (5.04)	-1.68
Focus	Control (n = 27)	35.15 (3.07)	34.63 (3.61)	-0.52
	Experimental (n = 28)	32.00 (3.41)	34.00 (3.90)	+2.00
Emotional Regulation	Control (n = 27)	33.89 (4.41)	33.48 (4.60)	-0.41
	Experimental (n = 28)	32.21 (4.37)	34.25 (3.86)	+2.04

Note. Possible range per subscale = 10 to 50. Higher scores indicate greater stress, greater focus, and better emotional regulation. Experimental n reflects matched pre-post responses.

Figure 1: Mean Change in Stress, Focus, and Emotional Regulation from Pre-Test to Post-Test by Group



Note. Bars show mean post-test minus pre-test change for each variable. Positive values indicate an increase; for stress, a decrease (negative value) reflects improvement.

A statistically significant within-group improvement in focus was shown by the experimental group, $t(27) = 2.52$, $p = .018$, $d = 0.48$ (Wilcoxon $p = .019$), and a marginal improvement in emotional regulation was found, $t(27) = 1.98$, $p = .058$. No significant change in stress was found, $t(27) = -1.60$, $p = .122$. No

significant within-group change on any variable was shown by the control group (all $p > .36$). A significant advantage for the experimental group on focus was shown in between-group comparison of gain scores, $t = 2.56$, $p = .013$, $d = 0.69$ (Mann-Whitney $p = .019$), with non-significant trends found for emotional regulation ($p = .059$) and stress ($p = .080$).

However, significantly higher stress, $t = 2.43$, $p = .019$, and significantly lower focus, $t = -3.59$, $p < .001$, were shown by the experimental group at baseline relative to the control group, despite random allocation. When post-test scores were adjusted for this baseline difference using ANCOVA, a statistically significant group effect was not found for any outcome, namely stress ($p = .558$), focus ($p = .292$), or emotional regulation ($p = .190$), as summarised in Table 2.

Table 2: Summary of Within-Group, Between-Group, and Baseline-Adjusted (ANCOVA) Significance Tests

Outcome	Within-Group (Experimental)	Between-Group (Gain Scores)	ANCOVA (Baseline-Adjusted)
Stress	$p = .122$	$p = .080$	$p = .558$
Focus	$p = .018$	$p = .013$	$p = .292$
Emotional Regulation	$p = .058$	$p = .059$	$p = .190$

Note. Simple within-group and between-group tests suggested a significant focus benefit at the .05 level, but this did not survive covariate adjustment for baseline non-equivalence.

Despite the largely null adjusted results, consistently positive feedback was reported by the experimental group: regular attendance at sessions was reported by 72.4 percent, a sense of relaxation was reported by 82.8 percent, improved concentration was perceived by 86.2 percent, better stress management was felt by 75.9 percent, and a wish to continue the practice was expressed by 79.3 percent.

Discussion

Whether stress, focus, and emotional regulation could be improved by a brief, two-week guided meditation programme among engineering students during placement training was investigated in this study. A statistically significant simple improvement in focus was shown by the experimental group, and a marginal improvement in emotional regulation was found, directionally consistent with all three hypotheses. However, these effects were not sustained once pre-existing baseline differences between groups were statistically controlled, a pattern consistent with regression to the mean, given that the experimental group began further from the scale midpoint on both stress and focus. On the primary, baseline-adjusted analysis, the null hypotheses for all three outcomes are therefore retained, although cautiously, given the consistent direction of effects and the strongly positive subjective feedback obtained.

The pattern of a reliable focus benefit alongside a weaker stress benefit can be read through the theoretical framework outlined in the Introduction. Under the transactional model of stress and coping, a reduction in stress requires cognitive appraisal of the placement-training situation to be altered (R.S. Lazarus and S. Folkman, 1984) [4]; two weeks may be too brief for appraisal of a prolonged, high-stakes situation to be meaningfully revised, particularly given the experimental group's elevated baseline stress. Attentional

stability, by contrast, is trained directly within each meditation session under mindfulness theory (J. Kabat-Zinn, 1990) [5], which may explain why a directly trained skill such as focus showed a detectable benefit before an appraisal-dependent outcome such as stress did. Under the process model of emotion regulation, in which earlier recognition of an emotional reaction is the proposed mechanism of change (J.J. Gross, 1998) [6], the marginal emotional regulation finding is likewise consistent with a two-week window being sufficient to begin, but not to consolidate, this skill.

More robust meditation effects than were observed here have generally been reported in the broader literature (S. Chen and X. Qi, 2025; M. Goyal et al., 2014; D. Oman et al., 2008) [9, 8, 13]. This discrepancy plausibly reflects differences in intervention dose: four to eight weeks of structured, often facilitator-led practice were delivered to larger samples in several of the more strongly positive trials, whereas two weeks of daily practice were delivered to a comparatively modest sample of 55 to 56 participants in the present study. The significant simple improvement in focus is nonetheless broadly consistent with evidence that attentional benefits are produced by concentrative meditation even after brief exposure (J.C. Basso et al., 2019; D.A. Ziegler et al., 2019) [11, 17].

Several limitations should be considered when these results are interpreted. Although within the range recommended for parametric analysis, the sample size sits at its lower bound, and statistical power was limited, particularly for the conservative ANCOVA model. Full equalisation of the groups at baseline was not achieved by random allocation, complicating causal interpretation despite the covariate adjustment applied. The two-week intervention window is short relative to protocols associated with more robust effects in prior research, and although acceptable internal reliability was shown by the outcome measure ($\alpha = .71$ to $.73$), independent validation of the measure had not previously been established. No active comparison condition was included for the control group, so non-specific attention or expectancy effects cannot be ruled out as contributors to the improvement reported by the experimental group.

Notwithstanding these limitations, brief meditation sessions are suggested to be well received and of potential practical value, even where composite psychometric change proves modest or statistically fragile, by the consistently positive subjective response reported (72 to 86 percent of the experimental group reported benefit across relaxation, concentration, and stress management). Piloting of short meditation sessions within placement-training schedules may reasonably be considered by institutions on this basis, while the present findings are treated as preliminary. Larger, adequately powered samples with stratified randomisation should be employed in future research to ensure baseline equivalence, the intervention period should be extended to four to eight weeks, an active control condition should be incorporated, and validated instruments alongside physiological outcome measures should be considered to strengthen causal inference.

In conclusion, directionally favourable and subjectively well-received effects on stress, focus, and emotional regulation were produced by a brief guided meditation intervention among students undergoing placement training, with the strongest evidence found for a focus benefit. These effects were not sustained as statistically significant once baseline differences between groups were controlled, so larger and more tightly controlled replication is indicated before meditation can be recommended as an evidence-based component of placement-training programming.

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