Emotional Intelligence and Perceived Stress Among Postgraduate Engineering Students: A Cross-Sectional Study

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***Abstract*—Emotional intelligence (EI) can be a critical tool for post-graduate engineering students, who frequently deal with high levels of workload and academic pressure. EI can be crucial in controlling perceived stress. The term "perceived stress" describes how people understand and respond to environmental pressures. Students possessing elevated emotional intelligence might find themselves more adept at managing the challenges in their personal and academic spheres. This capability could potentially mitigate stress levels while simultaneously improving academic success and overall welfare. This study aims to assess how EI correlates with the perceived stress levels among postgraduate engineering students. Using a convenience sample and a cross-sectional, descriptive correlational approach, 283 students aged 21 years and older were selected from Virudhunagar. Conventional self-administered surveys, "The Schutte Self-Report Emotional Intelligence Test (SEIT)" and "Perceived Stress Scale (PSS-14)," were used to measure EI and PS individually. Results indicates the relationship between managing one's own emotions and perceived stress was found to be negative and significant (β = -0.033, t = 2.199, p = 0.028). Managing other emotions showed a substantial positive and significant linkage with perceived stress (β = 0.404, t = 15.170, p < 0.001). Perceptions of emotion demonstrated a potent positive and significant correlation with perceived stress (β = 0.700, t = 26.903, p< 0.001). Utilization of emotions was negligibly related to perceived stress (β = 0.005, t = 0.251, p = 0.802). These findings suggest that while self-regulation helps alleviate stress, heightened interpersonal emotional management may contribute to stress among postgraduate engineering students**

***Keywords*— Emotional Intelligence (EI); Emotional regulation; perceived stress; post-graduate students**

***JEET Category*—Research**

I. INTRODUCTION

The notion of EI indicates the ability, aptitude, talent, or self-perceived competence to recognize, evaluate, and govern self-emotions as well as those of other individuals or groups (Serrat, 2017). Individuals with high emotional intelligence are highly self-aware and perceptive of others' emotions. They are cheerful, adaptable, and sensitive. "Perceived stress" describes how someone feels or thinks about how much stress they are under at a certain moment or over a certain amount of time (Phillips, 2013). In this study, "own emotions" refers to a person's capacity to identify and control their own emotional reactions, which in turn lowers stress. "Other emotions" refer to the ability to read and control the feelings of others in social or academic situations, which can occasionally lead to stress because of the heightened emotional demands. Determining how various facets of emotional intelligence affects postgraduate engineering students' reported stress levels requires an understanding of this distinction. While EI plays a crucial role in stress management, external factors such as academic workload, peer relationships, and cultural expectations also contribute significantly to students' stress levels. Prior research (Balaji et al., 2019; Bisai & Chaudhary, 2017; Patil et al.,2023; Parkavi & Karthikeyan, 2022) indicates that engineering students face rigorous coursework and high parental expectations, which may moderate the impact of EI on perceived stress. Additionally, competitive peer environments and social comparisons may further intensify stress levels. Peer relationships can either provide social support that mitigates stress or act as a source of pressure due to competition and performance comparisons. (Enns et al., 2018; Ullah et al., 2023) Cultural expectations, particularly in collectivist societies where family and societal pressure to excel academically is high, further compound stress levels (Mayildurai et al., 2019; Jahan et al., 2022). Thus, understanding the relationship between EI and perceived stress requires consideration of these external influences.

The experiences of an undergraduate and a postgraduate student differ. Planning, organizing, and structuring their own learning is a requirement for postgraduate students. It will be up to them to read and conduct research. Though there will be deadlines, oversight, and assistance along the way to keep them on course, they must determine their goals and

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parameters. At the master's level, they should acquire and exhibit abilities including logical reasoning, inductive and deductive reasoning, and critical analysis. The PhD is the next level where we anticipate a contribution to knowledge. Pursuing a postgraduate degree requires a whole new mindset.

According to additional research (Abrham et al., 2019; Shetty et al., 2020; and Spangenberg & Orpen-Lyall,2000), post-graduate students frequently experience significant stress. Stress levels are higher for postgraduate students. They face a multitude of stressors in both their personal and educational spheres. The primary causes of stress among the students were mental and physical health issues, peer pressure, expectations, trouble setting priorities, competition, freedom, family, employment, relationships, and social situations. This research adds to the body of knowledge by (1) demonstrating the unique impacts of various emotional intelligence (EI) dimensions on postgraduate engineering students' perceived stress, (2) providing a sophisticated comprehension of the ways in which controlling one's own emotions differs from controlling others' emotions in terms of stress levels, and (3) offering practical suggestions for incorporating EI-based stress management techniques into higher education. These contributions strengthen theoretical knowledge while also offering educators and policymakers practical advice on how to create Emotional Intelligence (EI)-based initiatives that promote the wellbeing of students.

II.LITERATURE REVIEW

In 1990, Salovey and Mayer classified emotional intelligence (EI) under the broader category of social intelligence. Mayer et al., (2011) noted that people used the term emotional intelligence sporadically and inconsistently prior to 1990. The phrase "emotional intelligence" has gained attention from many scholars due to Goleman's successful book "Emotional Intelligence" (1995) (Uzzaman & Karrim, 2017). It is an expanding field of research, notably for scholars in education, medicine, and organizational behavior (Chandra, 2021).

The concept of perceived stress was first defined by Cohen et al. (1983), who introduced the common technique for appraising perceived stress, the Perceived Stress Scale (PSS). In the dynamic approach to stress and coping by Lazarus and Folkman (1984), people utilize cognitive and behavioral tactics to deal with stress.

Austin et al. (2010) discovered that emotional intelligence and self-control are crucial for engineering students to handle their academic stress. Emotional awareness empowers them to successfully identify and address stressors, while self-regulation enables them to control their emotional responses to stressful situations. Furthermore, academics have identified a correlation between EI and students' sustained commitment to engineering programs, as well as their academic achievements. Studies conducted by Parker et al. (2004) show that students with greater EI perform better academically and report feeling less stressed. This indicates that emotional intelligence plays a part in resilience and the ability to thrive in challenging academic environments. Still, there is not always a clear-cut correlation between EI and perceived stress. Other elements, including individual differences, social support, and personality traits, may buffer this link, according to some research findings. Schutte et al. (2002) pointed out, for instance, that although EI strongly predicts perceived stress, supportive relationships and the person's pre- existing level of stress resilience can impact its influence.

Enns et al. (2018) carried out a cross-sectional study with a focus on university students in helping disciplines. Researchers executed exhaustive research to examine the association between EI and PS, along with the potential mediation function of coping mechanisms. Ullah et al. (2023) focused on the function that social support played as a mediating factor in the association between academic pressure and EI among tertiary-level students, specifically those who pursued their studies remotely during the pandemic. Saini et al. (2020) studied emotional intelligence in 3rd-year nursing students. Additionally, Rehman et al. (2020) conducted a prevalence study investigating the variables that lead to exam anxiety in final medical students.

In their scoping review, Jahan et al. (2022) employed both qualitative and quantitative research methods to scrutinize the connection between dental students' EI and stress. Data from 15 different countries demonstrated an unfavorable correlation between stress and EI. Students who received training to increase their emotional intelligence demonstrated diminished pressure and comparable results by Khorsani et al. (2023) showed which improving social consciousness, student connections, self- awareness, self-management, and assistance from other facets of EI can be beneficial in lessening stress that stems from intellectuals.

Existing research emphasizes the role of emotional intelligence in reducing perceived stress among students. However, findings are inconsistent regarding its impact on various dimensions of stress. Some studies indicate that self-regulation and emotional awareness contribute positively to academic resilience, while others highlight that heightened emotional perception may increase sensitivity to stressors. Future studies should investigate moderating elements such peer relationships, academic workload, and cultural expectations in order to ascertain the role of emotional intelligence (EI) in stress management.

A. Study Objectives and Proposed Hypothesis:

The purpose of this research is to examine the link between EI and perceived stress in postgraduate engineering students.

H1: There is a significant negative relationship between managing one's own emotions and perceived stress among postgraduate engineering students.

H2: There is a significant positive relationship between managing other emotions and perceived stress among post-graduate engineering students.

H3: There is a significant positive relationship between perceptions of emotions and perceived stress among postgraduate engineering students.

H4: There is a significant positive relationship between the

utilization of emotions and perceived stress among postgraduate engineering students.

Fig 1 illustrates the conceptual framework for emotional intelligence and perceived stress for this analysis. It shows the connection between the independent variable (EI) and the dependent variable (perceived stress), indicating that emotional intelligence relates to the perceived stress experienced by engineering students. Specifically, it suggests a positive association between EI and perceived stress.

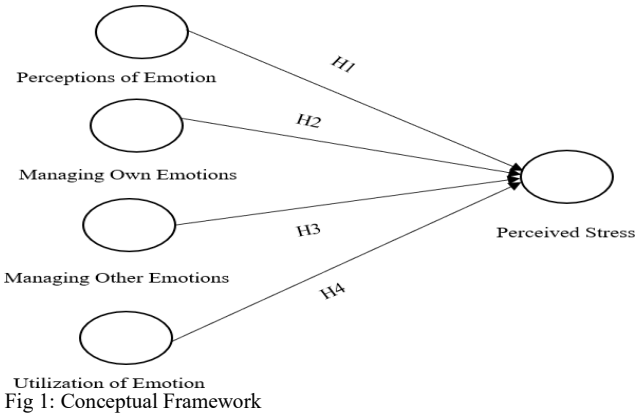

Fig 1: Conceptual Framework

III.METHODOLOGY

A. Participants and Data Collection:

Using a convenience sample approach, the study employed a cross-sectional design with engineering students as participants. We sent an email containing elaborate directions for completing an online questionnaire via Google Forms to 400 engineering students. The guidelines also stated that we would keep the collected data confidential and use it exclusively for this research, aiming to encourage participation. Participants elected to take part, indicating their approval by checking a box on the online form. We received and analyzed a total of 283 responses for this study.

The researcher gathered a total of 334 samples, of which 283 were included in the analysis, as shown in TABLE I. This count meets the prescribed sample size criterion of 200 for performing partial least squares structural equation modelling (PLS-SEM) analysis, as advocated via Kline (2005). The researcher discarded the remaining samples because they either contained repetitive information or exhibited signs of biased responses. The respondents included 149 males (53 percent) and 134 females (48 percent), with the majority being under 25 years old (42 percent). SPSS was employed to clean the data, while SmartPLS was utilized to evaluate the hypotheses. The descriptive statistics are shown in TABLE I.

TABLE I
DESCRIPTIVE STATISTICS

Details	No. of respondents	%
Age of the respondents		
Less than 25	118	42
26-30	96	34
More than 30	69	24
Gender of the respondents		
Male	149	53
Female	134	48
Education qualification of the respondents		
M.E	79	28
MTech	93	33
Ph. d	85	30
Others	26	9
District		
Virudhunagar	127	45
Madurai	97	34
Others	59	21

B. Measures

Nicola Schutte et al. (1998) developed the 33-question Schutte Self-Report Emotional Intelligence Test (SSEIT) to gauge emotional intelligence. The questionnaire includes 4 subscales: "perception of emotion," "managing one's own emotions," "managing others' emotions," as well as "utilization of emotion." According to this study, "own emotions" refers to a person's capacity to identify and control their own feelings in order to properly manage stress. On the other hand, "other emotions" refer to the capacity to recognize, understand, and affect the feelings of others. This can occasionally worsen stress because social and academic situations demand more emotional workout. Respondents use a five-point scale to evaluate themselves on each issue. The scale ranges from 33 to 165, with increased numbers reflecting greater EI. The SEIT demonstrates strong internal consistency, with a Cronbach's alpha of 0.90 and a test-retest reliability of 0.78 within a two-week timeframe.

Cohen et al. (1983) formulated the Perceived Stress Scale (PSS- 14). This instrument comprises two subscales: the positivity 7 subscale (items 4, 5, 6, 7, 9, 10, and 13) and the negativity 7 subscale (items 1, 2, 3, 8, 11, 12, and 14). PSS scores range between 0 and 56, with elevated scores correlating with elevated perceived stress levels. The PSS exhibits robust internal consistency (Cronbach's alpha=0.85) and test-retest reliability (0.85) over a two-day interval. Previous research on the South Indian population has made use of the SSEIT and the PSS (Margret & Lavanya, 2017; Brahmbhatt et al., 2013).

C. Data Analysis

For this study, SmartPLS 4 (version 4.0.8.9) was employed to measure the conceptual framework. PLS-SEM was selected due to the impracticality of CB-SEM for estimating complex models containing numerous latent variables (Hair et al., 2017). PLS models are often investigated and analyzed in two stages: first, using a structural model to

testing the specified research hypothesis, and second, using a measurement model to evaluate validity and reliability (Hair et al., 2017).

IV.RESULTS

A. Evaluation of the measurement model

Using the SEM, which starts by providing the indicator (outer) loading and confirming the validity and reliability of the factors, it is possible to identify the interdependencies between the variables. TABLE II displays the reliability and validity measurements. Cronbach's alpha values of facets reveal that all of the indicators have met the minimal cut-off point of 0.7 (Hair et al., 2012), demonstrating internal reliability. Content validity is the systematic evaluation of content to ascertain the extent to which items adequately cover or represent a particular construct. The ability to generalize the study's findings depends on construct validity, which describes how far the test deviates from what it is intended to measure. The constructs meet the criteria for content and construct validity due to their adoption from previous work. Three techniques can be applied to gauge convergent validity. All item loadings must be> 0.5, all constructs must have composite reliability > 0.7, and the average extracted variance values across all variables must transcend 0.5 (Fornell and Larcker, 1981). TABLE II demonstrates the findings concerning research.

TABLE II
RELIABILITY AND VALIDITY MEASUREMENTS

Construct	Items	Item loadings	Cronbach's alpha	Composite reliability	AVE
Managing Own Emotions	MOE1	0.826	0.867	0.909	0.715
	MOE2	0.852			
	MOE3	0.871			
	MOE4	0.833			
Managing other Emotions	MORE2	0.872	0.879	0.925	0.805
	MORE5	0.950			
	MORE7	0.913			
Perceived Stress	PS10	0.853	0.908	0.927	0.645
	PS11	0.810			
	PS4	0.759			
	PS5	0.819			
	PS6	0.724			
	PS8	0.845			
	PS9	0.804			
Perceptions of Emotion	EI10	0.767	0.908	0.932	0.734
	EI6	0.896			
	EI7	0.857			
	EI8	0.898			
	EI9	0.858			
Utilization of Emotions	UOE1	0.850	0.8800	0.916	0.732
	UOE2	0.855			
	UOE3	0.868			
	UOE4	0.849			

The reliability and validity measurements confirm the robustness of the study's constructs. The Cronbach's alpha values (ranging from 0.867 to 0.908) indicate high internal consistency, ensuring that the constructs measured in this study are reliable. Composite reliability values between 0.909 and 0.932 further reinforces this robustness. Additionally, strong convergent validity is indicated by Average Variance Extracted (AVE) values greater than 0.5, which show that the items assess their target components successfully. The Fornell-Larcker criterion, which is used in discriminant validity analysis, ensures that the study variables (perceived stress and emotional intelligence aspects) do not overlap in measurement by verifying that each construct is unique. These findings validate the appropriateness of the measurement model and strengthen the credibility of the study's results.

The validation of discriminant validity was conducted using the Fornell-Larker criterion approach. The Fornell-Larker criterion technique, which is similar to the construct score correlation after adjustment, estimates the correlation between the constructs. Reflectively measured models are thought to be a good fit for the Fornell-Larker criterion technique. According to Fornell and Larker (1981), discriminant validity is believed to have been attained if the Fornell-Larcker criterion values are less than 0.85. TABLE III demonstrates that every result is less than 0.85, indicating that discriminant validity has been attained.

TABLE III
DISCRIMINANT VALIDITY

Constructs	Managing Own Emotions	Managing Other Emotions	Perceived Stress	perception of Emotion	Utilization of emotions
Managing Own Emotions	0.846				
Managing Other Emotions	0.562	0.897			
Perceived Stress	0.576	0.831	0.803		
Perception of Emotion	0.541	0.632	0.940	0.857	
Utilization of Emotions	0.641	0.765	0.718	0.608	0.856

B. Structural model assessment

The relationship's strength and significance are shown in TABLE IV (t-statistics). TABLE IV presents the results of a statistical analysis examining the relationships between various aspects of emotional intelligence (independent variables) and perceived stress (dependent variables). Each hypothesis (H1 to H4) tests a different aspect of this relationship. The table comprises the original sample beta coefficients (β), sample means (M), standard deviations, t-statistics, and p-values for each hypothesis. Managing one's own emotions had a significant negative association with perceived stress (=-0.033; t=2.199; p<0.05). Managing other emotions had a significant positive

association with perceived stress (□=0.404; t=15.170; p<0.05). Similarly, perceptions of emotion had a significant positive association with perceived stress (□=0.700; t=26.903; p<0.05). Utilization of emotions (□= 0.005; t=0.251; t=0.802) had a negligible effect and lack of statistical significance with perceived stress.

TABLE IV
DIRECT EFFECT ANALYSIS IN THE STRUCTURAL MODEL POST-BOOTSTRAP

	Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation	t-statistics	P values
Managing Emotion -> Perceived Stress	H1	-0.033	-0.033	0.015	2.199	0.028
Managing Other Emotion -> Perceived Stress	H2	0.404	0.407	0.027	15.170	0.000
perception Of Emotion -> Perceived Stress	H3	0.700	0.699	0.026	26.903	0.000
Utilization Of Emotion -> Perceived Stress	H4	0.005	0.004	0.018	0.251	0.802

V.DISCUSSION

The analysis indicated a significant negative relationship between managing one's own emotions and perceived stress (β = -0.033, p= 0.028). This implies that postgraduate engineering students who excel at regulating their emotions are likely to experience lower levels of perceived stress. This finding aligns with previous research emphasizing the critical role of intrapersonal emotional regulation in reducing stress (Goleman, 1995; Salovey & Mayer, 1990). Managing others' emotions demonstrated a significant positive association with perceived stress (β = 0.404, p < 0.001). This implies that students who demonstrate greater proficiency in managing others' emotions tend to report elevated stress levels. The extra emotional effort required to manage others' emotions, which can intensify personal stress levels (Hochschild, 2012), may contribute to this phenomenon. These results suggest that while self-regulation reduces stress, heightened sensitivity to others' emotions can lead to increased stress levels, particularly in academic environments that require collaborative work. Therefore, fostering a balanced approach to emotional intelligence-where students learn to regulate both their own emotions and their interactions with others-can improve overall well-being. Institutions should integrate structured EI training programs into engineering curricula to help students develop coping mechanisms that mitigate stress without compromising interpersonal effectiveness. There exists a highly significant positive connection among perceptions of emotion and perceived stress (β = 0.700, p < 0.001). This implies that students with a heightened awareness of emotional signals and subtleties tend to experience elevated levels of stress. This might suggest that being extremely attuned to emotional subtleties may result in overthinking and heightened stress levels, a concept corroborated by research on emotional overexcitability (Piechowski, 1997). The relationship between emotion utilization and perceived stress did not show significance (β = 0.005, p = 0.802). This suggests that the capacity to utilize emotions to enhance cognitive tasks does not notably influence perceived stress levels among postgraduate engineering students. This discovery contradicts certain prior research indicating that proficient use of emotions can assist in managing stress (Zeidner et al., 2009).

The constructs assessed demonstrate excellent consistency and validity. Cronbach's alpha values fall within the range of 0.867 to 0.908, while composite reliability scores range from 0.909 to 0.932, suggesting strong internal reliability. Moreover, the Average Variance Extracted (AVE) values transcend the suggested limit of 0.5, signifying robust convergent validity (Fornell & Lancker, 1981). The correlations between the constructs demonstrate noteworthy connections. Self-emotion management, others' emotion management, perceived stress, emotion perception, and emotion utilization exhibit moderate to high correlations, ranging from 0.541 to 0.940. These associations highlight the interrelatedness of various dimensions of emotional intelligence and their combined influence on perceived stress.

The findings of this study highlight the significant associations between different dimensions of EI and perceived stress. Stress was found to be decreased by controlling one's own emotions, whereas elevated emotional perception and controlling the emotions of others were linked to higher stress levels. However, these relationships do not exist in isolation. External factors such as academic workload, peer interactions, and cultural expectations likely mediate or amplify these effects. Prior research indicates that stress is greatly increased by the heavy academic load in postgraduate engineering programs (Balaji et al., 2019). The need to balance coursework, research responsibilities, and project deadlines can exacerbate stress, regardless of an individual's level of EI. Similarly, peer dynamics play a crucial role. Although students who have good peer support networks may be better able to handle stress, a competitive peer environment may make stress levels higher, especially for extremely sensitive students (Bisai & Chaudhary, 2017). Furthermore, students may face additional challenges due to cultural expectations. Students in societies where achieving academic achievement is strongly linked to social and familial expectations may experience extreme pressure to perform,

which can exacerbate feelings of stress (Mayildurai et al., 2019).

In light of these elements, universities and mental health professionals should consider holistic interventions that address both EI and external stressors. In addition to our quantitative findings, previous studies highlight student narratives on stress management. For instance, a study by Enns et al. (2018) describes how engineering students with strong EI develop adaptive coping mechanisms, such as seeking peer support and using structured study routines. Additionally, qualitative responses from students indicate that many struggle with balancing academic pressures and social expectations, often feeling overwhelmed by competitive environments. Some students stated that although emotional intelligence abilities aided in stress management for them personally, they had trouble controlling their emotions when faced with pressures involving their peers. These findings point to the necessity of tailored intervention programs that address specific stresses and prioritize peer support systems and resilience-building strategies.

Implementing EI-based stress management training programs, which include emotion regulation techniques, mindfulness training, and cognitive reappraisal, is one successful strategy. Through these programs, students can improve their self- awareness, learn flexible coping strategies, and control their emotional reactions to stress. Universities can include these training programs in their curricula through curriculum-based interventions, counselling services, and workshops to give students useful skills for stress management and balancing different facets of emotional intelligence. Research suggests, "Universities can integrate EI training programs focusing on self- regulation, mindfulness, and cognitive reappraisal. Studies have shown that structured interventions, such as social-emotional learning programs, significantly reduce academic stress (Khorsani et al., 2023)." Strategies such as workload management training, peer support initiatives, and culturally sensitive counselling programs can help students manage stress more effectively.

A. Limitations and Future Research

Despite its contributions, this study has certain limitations. First, it primarily focuses on the direct relationship between EI and perceived stress without incorporating external mediators such as academic workload, peer influence, and cultural expectations. Future studies should examine the ways in which these elements interact with EI to influence stressors. Deeper understanding of how the effects of these outside variables change over time may be possible with longitudinal research. Furthermore, qualitative research techniques like focus groups or in-depth interviews may provide further insights into how students deal with these pressures.

Future research could also look at intervention plans that address external stressors and improve emotional intelligence. Students could be given comprehensive coping methods, for example, by combining academic stress management courses with emotional intelligence training. Future studies may provide more comprehensive understandings of the intricate connection between postgraduate engineering students' perceived stress and emotional intelligence by addressing these external factors.

CONCLUSION

This study underscores the dual impact of emotional intelligence on perceived stress among postgraduate engineering students. Managing one's own emotions serves as a protective factor, reducing stress, whereas managing others' emotions can act as an additional burden, leading to increased stress levels. These findings have important implications for both students and educators, emphasizing the need for structured emotional intelligence training. By integrating EI-based strategies into academic programs, institutions can equip students with the tools needed to navigate high-pressure environments effectively. Future research should explore how cultural and peer dynamics further shape these relationships, ensuring a comprehensive approach to stress management in educational settings.

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