

EMOTIONAL INTELLIGENCE, PROBLEM-SOLVING SKILLS, AND ACADEMIC ACHIEVEMENT AMONG PAKISTANI UNIVERSITY STUDENTS DURING COVID-19

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Abstract

The growing academic competitiveness within Pakistani higher education institutions necessitates a comprehensive examination of psychosocial determinants that influence students' academic performance, particularly during large-scale crises such as the COVID-19 pandemic. The present study investigated the interrelationships among emotional intelligence, problem-solving skills, and academic achievement, examined gender-based differences, and identified key psychological predictors of academic success among Pakistani university students during the COVID-19 period. A correlational research design was employed, and data were collected from a purposive sample of 200 undergraduate students (100 males and 100 females) enrolled in public and private universities across Pakistan. Emotional intelligence was assessed using the Schutte Self-Report Emotional Intelligence Scale, problem-solving skills were measured through the Problem-Solving Inventory, and academic achievement was operationalized using cumulative grade point average (CGPA). Statistical analyses were conducted using SPSS (Version 21), including Pearson product-moment correlation, multiple hierarchical regression, and independent-samples t-tests. Results revealed a significant positive association between emotional intelligence and academic achievement, while problem-solving skills also demonstrated a meaningful relationship with academic performance. Hierarchical regression analysis indicated that emotional intelligence emerged as a significant predictor of academic achievement beyond problem-solving skills. Furthermore, statistically significant gender differences were observed across multiple dimensions of emotional intelligence and problem-solving skills, with female students demonstrating higher scores than male students during the pandemic period. These findings highlight the critical role of emotional competencies in shaping academic success within the Pakistani higher education context, which traditionally emphasizes cognitive performance and grades. The study underscores the importance of integrating emotional intelligence-based interventions, including psychoeducational workshops and self-regulatory skill development programs, into university curricula to promote holistic student development and enhance academic outcomes during and beyond times of crisis.

1. INTRODUCTION

The outbreak of the coronavirus disease (COVID-19) rapidly spread across the globe and profoundly disrupted nearly all sectors of society, with the education sector being among the most severely affected. Countries worldwide experienced prolonged lockdowns and abrupt institutional closures, forcing higher education systems to transition to emergency remote learning modalities (Aucejo et al., 2020). Universities, colleges, and other academic institutions faced unprecedented challenges, while students encountered substantial academic, psychological, and social disruptions. These included heightened financial insecurity, health-related fears, uncertainty regarding academic completion, and concerns about future career prospects. The sudden shift to online learning further exacerbated these challenges, often undermining students' academic plans, performance, and expectations.

Such an unstable academic environment rendered university students particularly vulnerable to psychological distress, including increased levels of stress, anxiety, and depression, largely due to limited coping mechanisms and underdeveloped problem-solving capacities. The COVID-19 pandemic significantly influenced students' academic achievement and negatively affected Pakistan's educational process, where learning environments traditionally rely heavily on student motivation and engagement. Students' interests and perceived needs play a crucial role in fostering academic excellence, even during periods of crisis. However, managing emotional distress alongside academic demands during the pandemic proved exceedingly difficult for many students. In this context, the present study aims to examine the role of emotional intelligence and problem-solving skills in shaping academic achievement among Pakistani University students during the COVID-19 pandemic.

Historically, early-twentieth-century psychologists primarily emphasized the cognitive aspects of intelligence, whereas later theorists, such as Thorndike, highlighted the importance of social intelligence. Gardner further expanded this perspective by introducing the concept of multiple intelligences, including intrapersonal and interpersonal intelligence. Over the past two decades,

emotional intelligence has emerged as a distinct construct that significantly contributes to individual success and achievement (Goleman, 1995). Emotional intelligence is widely regarded as a subset of social intelligence. Salovey and Mayer (1990) conceptualized emotional intelligence as the ability to perceive, understand, manage, and utilize emotions in oneself and others to guide thinking and behavior. Goleman (2010) further defined emotional intelligence as the capacity to recognize and regulate one's own emotions, understand others' emotions, and effectively manage interpersonal relationships.

Individuals with high emotional intelligence often develop in emotionally responsive environments, possess greater self-awareness, exhibit adaptive emotional expression, and demonstrate enhanced problem-solving abilities and moral sensitivity (Mayer, Salovey, & Caruso, 2004). Epstein described emotional intelligence as a form of mental competence that involves not only experiencing emotions but also understanding their meanings and implications. Emotional intelligence encompasses key motivational factors, such as persistence and goal orientation, that are instrumental to success. Fernandes and Rego (2004) demonstrated that emotional intelligence predicts life satisfaction, psychological wellbeing, and academic achievement. Within educational settings, the integration of emotional intelligence alongside cognitive intelligence has been associated with improved academic performance and enhanced quality of life among students (Mayer, Salovey, & Caruso, 2004).

According to the Salovey and Mayer (1990) Model, emotional intelligence comprises four core abilities: perceiving emotions, using emotions to facilitate thinking, understanding emotions, and managing emotions. This framework emphasizes the capacity to recognize emotional signals, comprehend their meanings, and regulate emotional responses to promote adaptive functioning. Emotional intelligence, therefore, represents a fundamental ability to manage and regulate emotional experiences effectively. Goleman (1998) conceptualized emotional intelligence as the ability to manage emotions constructively, express them appropriately, and collaborate effectively with others toward shared

goals. He identified four primary competencies underlying emotional intelligence: self-awareness, self-management, social awareness, and relationship management (Gujjar et al., 2010).

Problem-solving is a higher-order cognitive process that enables individuals to identify practical solutions and achieve desired goals (Düşek & Ayhan, 2014). It involves advanced cognitive functions, including critical thinking, reflective reasoning, creativity, scientific inquiry, and decision-making (Skinner, 1984). In educational contexts, problem-solving plays a central role in learning by fostering the generation of alternative solutions, enhancing metacognitive awareness, and strengthening causal reasoning. Polya (1971) proposed a four-step model of problem-solving: understanding the problem, devising a plan, executing the plan, and reflecting on the solution. Problem-solving competence is influenced by cognitive abilities as well as experiential and attitudinal factors, such as interest, motivation, and prior knowledge. It is widely regarded as a soft skill—a personal strength that can be cultivated through education and training (Düşek & Ayhan, 2014).

Empirical evidence underscores the importance of problem-solving skills in academic contexts. Farooq (1980) demonstrated that problem-solving approaches significantly enhance critical thinking and reasoning abilities. Mayer (1990) described problem-solving as a coordinated set of cognitive processes aimed at transforming situations in which solutions are not immediately apparent (Dostál, 2015). Problem-solving skills facilitate goal attainment by enabling individuals to overcome obstacles and manage challenges effectively (Düşek & Ayhan, 2014). Gestalt psychologists, such as Wertheimer, emphasized insight and structural understanding in problem-solving, while De Bono highlighted the importance of creative and lateral thinking. These skills are closely linked to cognitive schemas, pattern recognition, and creative solution generation (Frederiksen, 1984). As a personal and transferable competency, problem-solving enhances efficiency, adaptability, and resilience in both academic and real-world contexts (Dostál, 2015).

In contemporary society, education is widely perceived as a primary indicator of success and achievement. Academic achievement refers to the

knowledge and competencies acquired by students to fulfill socially defined educational objectives (Amusan, 2006). Millar and Irving (1995) conceptualized academic achievement as the cumulative outcomes of students' academic endeavors within educational institutions. Academic performance plays a critical role in shaping students' future opportunities, as variations in achievement differentiate individuals in terms of success and life trajectories (Ahmed et al., 2019). Cumulative Grade Point Average (CGPA) is commonly used to quantify academic achievement, as it reflects performance across multiple assessments. Despite the availability of various evaluative measures, CGPA remains one of the most reliable predictors of academic success among university students (Reisig & DeJong, 2005; Perveen, 2010).

1.2 Theoretical Perspectives

1.2.1 Bar-On Model of Emotional and Social Intelligence

The Bar-On Model conceptualizes emotional and social intelligence as an integrated set of emotional and social competencies, skills, and facilitators that influence individuals' ability to understand themselves and others, express emotions, cope with daily demands, and adapt effectively to environmental challenges. This Model comprises five meta-factors: intrapersonal skills, interpersonal skills, stress management, adaptability, and general mood. Collectively, these competencies determine emotional performance and significantly influence behavior, decision-making, and overall functioning. Emotionally and socially intelligent individuals demonstrate flexibility, resilience, effective stress management, and adaptive problem-solving in both personal and social contexts.

1.2.2 Ability Model of Emotional Intelligence

Developed by Mayer, Salovey, and Caruso, the ability Model conceptualizes emotional intelligence as a set of cognitive-emotional abilities. These include accurate perception of emotions, understanding emotional meanings, using emotions to facilitate thinking, and managing emotions to promote personal growth and adaptive functioning (Mayer, Salovey, & Caruso, 2001). According to this Model, individuals must first identify and comprehend

emotional experiences before utilizing and regulating them to guide thought processes and behavior.

1.2.3 Trait Model of Emotional Intelligence

Proposed by Konstantin Vasily Petrides, the trait Model views emotional intelligence as a constellation of emotional self-perceptions embedded within personality structures. Emotional traits and self-evaluations shape individuals' emotional functioning and influence behavior across contexts. These traits are relatively stable and require self-awareness for practical assessment and development (Petrides, Pita, & Kokkinaki, 2007).

1.2.4 Mixed Model of Emotional Intelligence

Introduced by Goleman, the mixed Model integrates emotional abilities with personality traits and social competencies. It identifies five key components of emotional intelligence: self-awareness, self-regulation, motivation, empathy, and social skills. Together, these dimensions contribute to effective leadership, communication, conflict management, and interpersonal functioning. Importantly, Goleman (2006) emphasized that emotional intelligence competencies can be developed through training and experience.

1.2.5 Walberg's Theory of Academic Achievement

Walberg's (1981) theory of educational productivity posits that a combination of psychological characteristics and environmental factors shapes students' academic outcomes. The Model identifies nine key variables influencing academic achievement, including student ability, developmental level, motivation, instructional quality and quantity, classroom climate, home environment, peer influence, and media exposure. These factors collectively interact to enhance or hinder academic performance.

1.3 Rationale

The COVID-19 pandemic caused profound disruptions to Pakistan's education system, exacerbating academic challenges and psychological distress among University students. Prolonged isolation, remote learning demands, and uncertainty regarding academic and career outcomes intensified stress and anxiety levels. Understanding

psychological factors that support academic resilience during such crises is therefore critical. Emotional intelligence fosters motivation, self-regulation, and adaptive coping, while problem-solving skills enhance individuals' capacity to manage challenges effectively. Although previous research suggests that these variables are associated with academic performance, they have rarely been examined concurrently within the Pakistani University context during crisis conditions. The present study addresses this gap.

1.4 Objectives

The present study aims to examine the relationships among emotional intelligence, problem-solving skills, and academic achievement among University students during the COVID-19 pandemic, a period marked by significant academic disruption and psychological stress. Specifically, it seeks to determine whether emotional intelligence and problem-solving skills serve as significant predictors of academic achievement under pandemic conditions, highlighting their individual and combined contributions to students' academic performance. In addition, the study explores potential gender differences in emotional intelligence, problem-solving skills, and academic achievement to determine whether male and female students differ in their emotional regulation capacities, cognitive coping strategies, and academic outcomes during COVID-19, thereby providing evidence to inform targeted and equitable educational interventions.

1.5 Hypotheses and Proposed Research Model

Building on contemporary theoretical and empirical literature, this study proposes an integrated research Model to examine the interrelationships among emotional intelligence, problem-solving skills, and academic achievement among University students during the COVID-19 pandemic, a period marked by unprecedented academic disruptions, psychological stressors, and a rapid shift to online learning environments that underscored the importance of students' internal resources for sustaining learning and performance. Emotional intelligence is conceptualized as a core personal resource enabling students to perceive, regulate, and

utilize emotions effectively in coping with academic and pandemic-related stress. At the same time, problem-solving skills are viewed as higher-order cognitive-behavioral competencies that support the analysis of academic challenges, generation of

adaptive solutions, and persistence under conditions of uncertainty; academic achievement, operationalized through CGPA, represents the ultimate educational outcome influenced by these emotional and cognitive capacities.

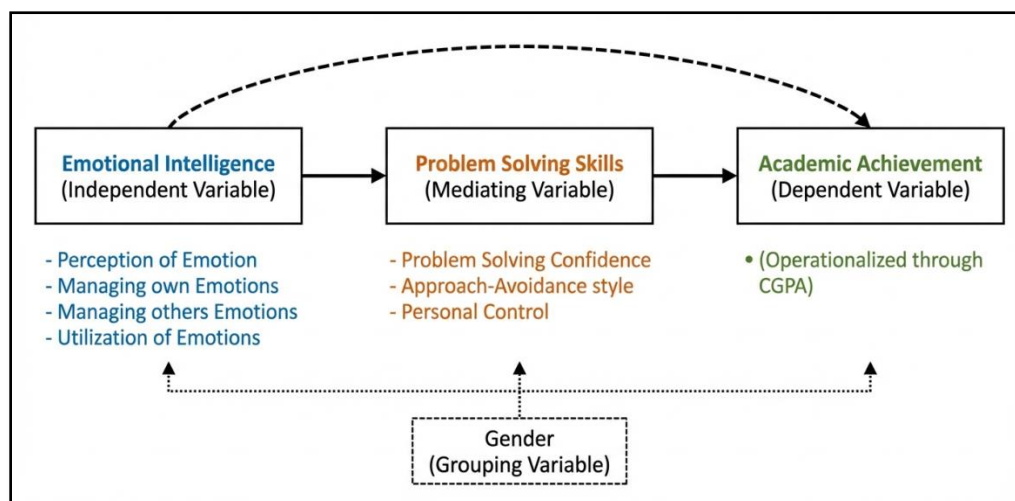


Figure 1. Proposed Research Model Linking Emotional Intelligence, Problem-Solving Skills, and Academic Achievement during COVID-19

As illustrated in **Figure 1**, emotional intelligence is modeled as an independent latent construct comprising four dimensions—perception of emotion, managing one's own emotions, managing others' emotions, and utilization of emotions—whereas problem-solving skills are specified as an independent construct consisting of problem-solving confidence, approach-avoidance style, and personal control. The proposed Model hypothesizes that emotional intelligence exerts both a direct effect on academic achievement and an indirect effect mediated through problem-solving skills, while problem-solving skills are also expected to have a direct positive influence on academic achievement; additionally, gender is included as a grouping or moderating variable to examine potential differences in emotional intelligence, problem-solving skills, and academic achievement between male and female students during the COVID-19 pandemic.

3. Method

3.1 Research Design

The present study adopted a cross-sectional correlational research design to examine the

relationships among emotional intelligence, problem-solving skills, and academic achievement among Pakistani University students during the COVID-19 pandemic. This design was selected to assess the direction and strength of associations among study variables and to determine their predictive contribution to academic achievement without experimental manipulation.

3.2 Participants and Sampling Strategy

The sample comprised 200 University students, with equal representation of males ($n = 100$) and females ($n = 100$), recruited from private universities in Lahore, Pakistan, using purposive sampling. Participants ranged in age from 18 to 26 years and included both undergraduate and postgraduate students who were actively enrolled during the pandemic period. Purposive sampling was employed to ensure that participants met the predefined inclusion and exclusion criteria relevant to the study's objectives.

3.3 Inclusion and Exclusion Criteria

Participants were eligible for inclusion if they were University students between the ages of 18 and 26 years and were actively enrolled during the COVID-19 pandemic. Both male and female students were included to facilitate examination of gender differences. Students who were on academic break during the pandemic, those enrolled in BSc (Hons) Semester I, and students following an annual grading system were excluded to maintain consistency in academic exposure and grading structure.

3.4 Conceptual and Operational Definitions of Variables

Emotional intelligence was conceptually defined as the capacity to perceive, appraise, regulate, and utilize emotions in oneself and others to facilitate adaptive functioning and effective problem-solving. Operationally, emotional intelligence was measured using total scores obtained on the Schutte Self-Report Emotional Intelligence Scale (Schutte, 1998), which is grounded in the Salovey and Mayer (1990) Model of emotional intelligence. Problem-solving skills were defined as individuals' perceived ability to identify, analyze, and resolve everyday problems effectively and in a timely manner. These skills were operationalized using scores derived from the Problem-Solving Inventory, which assesses problem-solving confidence, approach-avoidance tendencies, and perceived personal control in problem situations (Dostál, 2015). Academic achievement was operationalized using participants' self-reported cumulative grade point average (CGPA), as recorded on the demographic information sheet. CGPA was selected due to its established validity as a comprehensive indicator of sustained academic performance (Millar & Irving, 1995; Reisig & DeJong, 2005; Perveen, 2010).

3.5 Measures

Demographic characteristics were collected using a self-developed demographic information sheet that included age, gender, marital status, education level, academic major, and CGPA. Emotional intelligence was assessed using the Schutte Self-Report Emotional Intelligence Scale (SSEIS), a 33-item self-report instrument developed by Schutte et al. (1998) based on the Salovey and Mayer (1990) framework. The

scale measures four dimensions of emotional intelligence—perception of emotions, management of one's own emotions, management of others' emotions, and utilization of emotions—using a five-point Likert scale ranging from strongly disagree to agree strongly. Items 5, 28, and 33 were reverse-scored, and higher total scores indicate higher emotional intelligence. Problem-solving skills were measured using the Problem-Solving Inventory (PSI), a 35-item self-report measure developed by Heppner that assesses individuals' perceptions of their problem-solving abilities in everyday contexts. The inventory comprises three subscales: problem-solving confidence, approach-avoidance style, and personal control. Responses are recorded on a six-point Likert scale ranging from strongly agree to strongly disagree, with higher scores reflecting poorer perceived problem-solving ability and lower scores indicating more effective problem-solving appraisal (Soliman, 2014).

3.6 Procedure

Prior to data collection, permission to use the research instruments was obtained from the respective authors, and ethical approval was granted by Kinnaird College for Women, Lahore. Participants from undergraduate and postgraduate programs (second semester and above) were recruited using purposive sampling. Data were collected over approximately three to four months through both online (Google Forms) and in-person administration, as detailed in **Supplementary Tables 1 and 2**. Participants were informed of the study objectives, assured of confidentiality and anonymity, and advised of their right to withdraw at any stage without penalty. Written informed consent was obtained before administration of the demographic sheet, the Schutte Self-Report Emotional Intelligence Scale, and the Problem-Solving Inventory. Incomplete or randomly completed questionnaires were excluded to ensure data quality.

3.7 Ethical Considerations

Ethical principles were strictly observed throughout the study. Participation was entirely voluntary, and no participant was coerced into involvement. Confidentiality and anonymity of participants' personal information were maintained. Participants

were provided with clear explanations of the study procedures and were given opportunities to seek clarification prior to participation.

3.8 Statistical Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), Version 21. Pearson product-moment correlation analysis was employed to examine relationships among emotional intelligence, problem-solving skills, and academic achievement. Hierarchical multiple regression analysis was conducted to determine the predictive contribution of emotional intelligence and problem-solving skills to academic achievement. Independent-samples t-tests were used to examine gender differences across the study variables.

4. Results

The results provide a detailed statistical account of the findings derived from the investigation of emotional intelligence, problem-solving skills, and academic achievement among Pakistani University students during the COVID-19 pandemic. The results are reported systematically, beginning with the reliability and distributional properties of the study variables, followed by descriptive and correlational analyses, hierarchical multiple regression for predicting academic achievement, and finally, gender-based comparisons. All analyses were

conducted using SPSS (Version 21), and statistical significance was evaluated at conventional alpha levels.

4.1 Preliminary Analyses: Reliability and Distributional Properties

Prior to conducting hypothesis testing, a series of preliminary analyses was performed to examine the psychometric soundness and distributional characteristics of the study instruments. Specifically, internal consistency reliability and normality assumptions were evaluated to ensure the appropriateness of subsequent parametric statistical analyses. As summarized in **Table 1**, Cronbach's alpha coefficients for the overall Emotional Intelligence scale and its four subdimensions ranged from .91 to .94, indicating excellent internal consistency across all components. These findings confirm that the Schutte Self-Report Emotional Intelligence Scale demonstrated high reliability in the current sample, thereby supporting its use in inferential analyses. The reliability profile of emotional intelligence and its subdimensions is visually illustrated in **Figure 2a**, which depicts consistently high Cronbach's alpha values across all emotional intelligence domains.

Table 1: Psychometric Properties of the Study Variables (N = 200)

Variable	k	M	SD	Potential Range	Actual Range	α	Skewness	Kurtosis
Emotional Intelligence	33	1.83	.94	1-5	1.00-4.61	.93	.99	-.08
Perception of Emotion	10	2.37	.93	1-5	1.00-4.30	.93	.92	-.37
Managing Own Emotions	9	2.31	.76	1-5	1.00-4.67	.94	1.03	-.05
Managing Others' Emotions	8	2.31	.86	1-5	1.00-4.75	.93	1.09	.27
Utilization of Emotions	6	2.18	.69	1-5	1.00-5.00	.91	1.12	.44
Problem-Solving Skills	35	1.92	.49	1-6	1.10-3.29	.87	.59	-.44
Problem-Solving Confidence	11	2.24	.75	1-6	1.00-3.55	.71	.59	.53
Approach-Avoidance Style	16	2.19	.69	1-6	.94-3.40	.83	.65	-.29
Personal Control	5	2.18	.68	1-6	1.00-4.20	.80	1.05	-.05

Note. K = number of items; α = Cronbach's alpha; M = mean; SD = standard deviation.

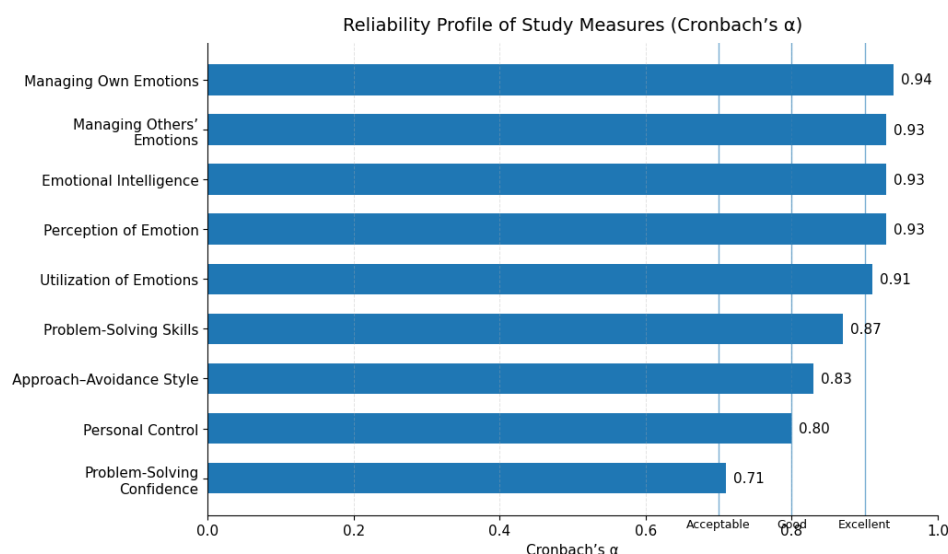


Figure 2a. Reliability Profile of Study Measures Based on Cronbach's Alpha

Similarly, the Problem-Solving Inventory exhibited satisfactory psychometric properties. The overall problem-solving scale yielded a Cronbach's alpha of .87, reflecting good internal consistency. Examination of the subscales revealed that approach-avoidance style ($\alpha = .83$) and personal control ($\alpha = .80$) demonstrated good reliability, while problem-solving confidence ($\alpha = .71$) showed acceptable reliability for research purposes. Collectively, these reliability coefficients indicate that the problem-solving constructs were measured with sufficient consistency in the present study population—the comparative reliability of problem-solving subdimensions reinforcing the adequacy of the measurement instruments.

In addition to assessing reliability, the distributional properties of the study variables were examined to evaluate the assumption of normality. Skewness and kurtosis statistics for emotional intelligence, problem-solving skills, and academic achievement were calculated and inspected. All skewness and kurtosis values fell within the acceptable range of ± 1.96 , indicating that the distributions of all study variables approximated normality. These findings suggest the absence of substantial departures from normality, such as excessive skewness or kurtosis, that could compromise parametric analyses. The joint distribution of skewness and kurtosis values across variables is graphically presented in **Figure 2b**, which demonstrates that all constructs fall well within the recommended normality thresholds.

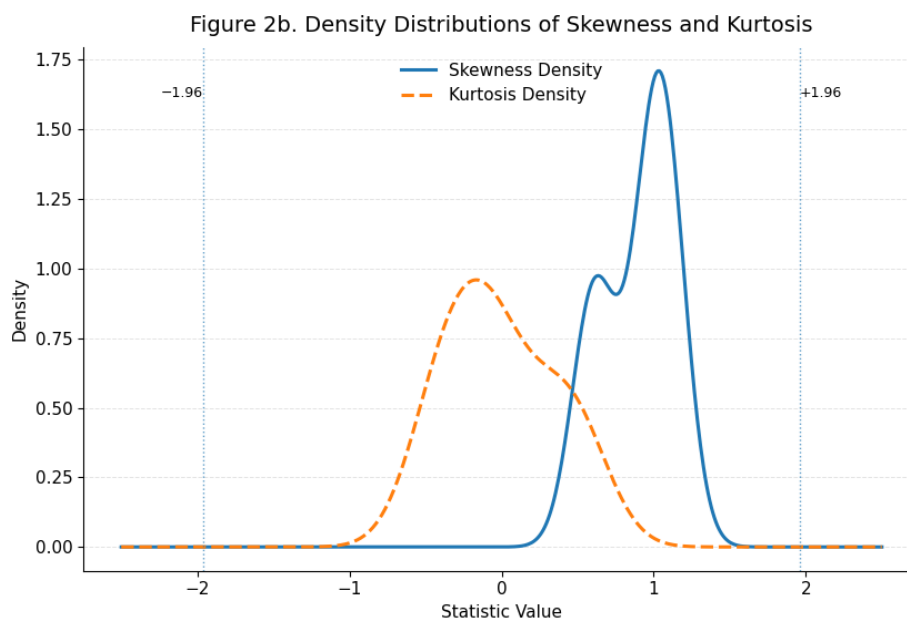


Figure 2b: kernel density estimates for skewness and kurtosis values demonstrate that the distributions of all study variables are centered well within the ± 1.96 threshold,

Furthermore, descriptive distributional patterns, including mean scores and associated variability, were examined to provide additional insight into the overall data structure. The descriptive profiles of emotional intelligence, problem-solving skills, and academic achievement are illustrated in **Figure 2c**, which presents the mean scores with corresponding standard deviations. This Figure indicates adequate variability across constructs, suggesting that the data were neither restricted in range nor excessively

dispersed. Taken together, the results of these preliminary analyses indicate that the measurement instruments used in the present study possessed strong internal consistency and that the distributions of the study variables satisfied the assumptions required for parametric statistical testing. Consequently, the data were deemed suitable for subsequent analyses, including Pearson product-moment correlation, hierarchical multiple regression, and independent-samples t-tests, conducted to address the study objectives.

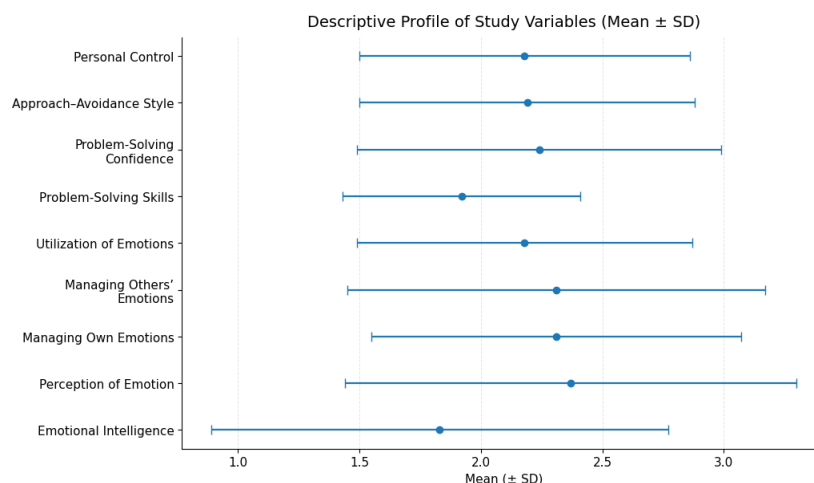


Figure 2c. Descriptive Profile of Study Variables (Mean $\pm$ Standard Deviation)
(Dot-and-whisker plot showing mean scores and variability for emotional intelligence, problem-solving skills, and academic achievement.)

4.2 Descriptive Statistics and Correlational Findings

Descriptive statistics and Pearson product-moment correlation coefficients for emotional intelligence dimensions, problem-solving skills, and academic achievement (CGPA) are summarized in Table 2. Overall, the correlational pattern revealed strong,

positive, and statistically significant associations among the study variables, indicating substantial interrelationships between emotional competencies, problem-solving capacities, and academic performance among University students during the COVID-19 pandemic.

Table 2: Descriptive Statistics and Pearson Correlations among Study Variables (N = 200)

Variable	M	SD	1	2	3	4	5	6	7	8
1. CGPA	2.30	.81	—							
2. Perception of Emotion	2.37	.93	.85***	—						
3. Managing Own Emotions	2.31	.76	.88***	.75***	—					
4. Managing Others' Emotions	2.31	.86	.94***	.90***	.84***	—				
5. Utilization of Emotions	2.18	.69	.47**	.46**	.55***	.44**	—			
6. Problem-Solving Confidence	2.24	.75	.77***	.64***	.86***	.72***	.63***	—		
7. Approach-Avoidance Style	2.19	.69	.46**	.44**	.53***	.44**	.94***	.61***	—	
8. Personal Control	2.18	.68	.49**	.45**	.56***	.46**	.93***	.63***	.96***	—

Note. $p < .01$, *** $p < .001$.

As illustrated in Figure 3a, academic achievement demonstrated strong positive associations with the core dimensions of emotional intelligence. Specifically, CGPA was strongly correlated with perception of emotion ($r = .85$, $p < .001$), managing

one's own emotions ($r = .88$, $p < .001$), and managing others' emotions ($r = .94$, $p < .001$). These associations indicate that students with higher levels of emotional awareness and emotional regulation tended to achieve higher academic performance

during the pandemic period. In comparison, the relationship between CGPA and utilization of emotions was moderate but statistically significant (r

$= .47, p < .01$), suggesting a comparatively weaker yet meaningful association with academic outcomes.

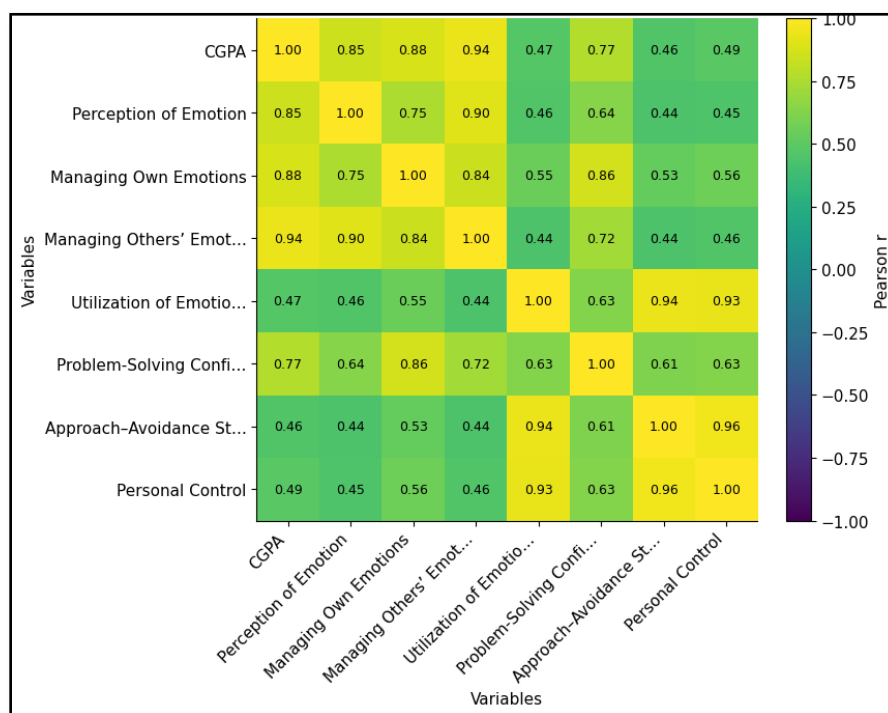


Figure 3a. Pearson Correlation Structure among Emotional Intelligence Dimensions, Problem-Solving Skills, and Academic Achievement (CGPA)

Regarding problem-solving skills, Figure 3a further demonstrates that academic achievement was strongly and positively associated with problem-solving confidence ($r = .77, p < .001$). This indicates that students who perceived themselves as capable and confident problem solvers tended to obtain higher CGPA scores. Additionally, CGPA showed moderate positive correlations with approach-avoidance style ($r = .46, p < .01$) and personal control ($r = .49, p < .01$), reflecting consistent associations

between adaptive problem engagement, perceived self-regulation, and academic performance. Beyond direct associations with academic achievement, substantial intercorrelations were observed among emotional intelligence dimensions and problem-solving skills. Perception of emotion, managing one's own feelings, and managing others' emotions were strongly and positively associated with problem-solving confidence, indicating that emotionally competent students tended to appraise themselves as more effective in managing problem situations.

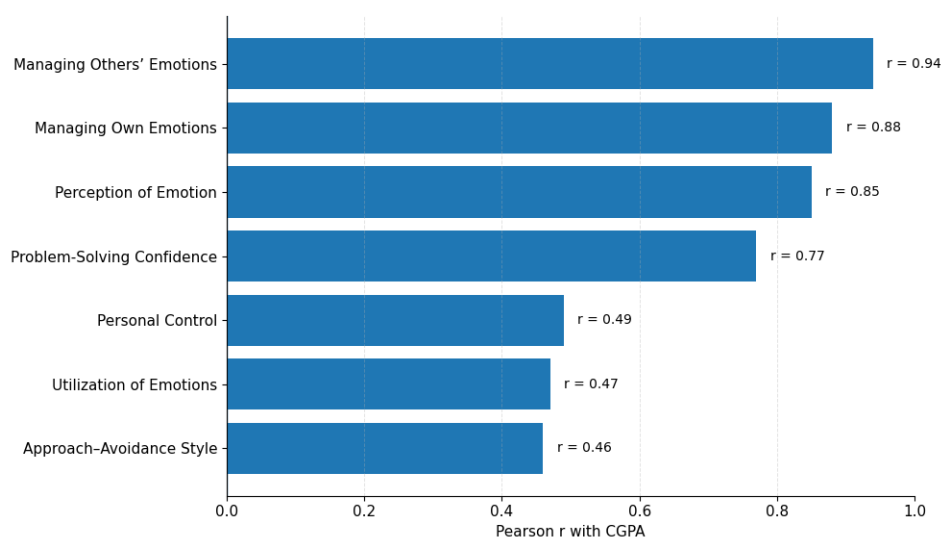


Figure 3b. Relative Strength of Associations between Academic Achievement (CGPA) and Emotional Intelligence and Problem-Solving Skill Dimensions

Furthermore, the use of emotions showed strong positive associations with all three problem-solving dimensions, highlighting the close linkage between emotional processing and cognitive coping strategies during periods of academic stress. The relative strength and direction of associations between CGPA and each emotional intelligence and problem-solving dimension are further summarized in **Figure 3b**, which provides a comparative visualization of the magnitude of correlations with academic achievement. Collectively, the findings indicate a coherent pattern in which emotional intelligence—particularly emotional perception and regulation—exhibited the strongest associations with academic achievement, followed by problem-solving confidence and other problem-solving dimensions.

4.3 Hierarchical Multiple Regression Analysis

To determine the relative and incremental contributions of emotional intelligence and problem-solving skills to academic achievement (CGPA), a hierarchical multiple regression analysis was conducted with CGPA as the dependent variable. Predictor variables were entered in two theoretically driven steps. In Model I, the four dimensions of emotional intelligence were entered simultaneously, followed by the three dimensions of problem-solving

skills in Model II. Preliminary diagnostics confirmed that all assumptions underlying multiple regression were satisfied. Specifically, no influential outliers were detected, the Durbin–Watson statistic fell within the acceptable range of 1–3, indicating independence of residuals, and tolerance and variance inflation factor (VIF) values confirmed the absence of multicollinearity. Visual inspection of standardized residual plots further supported assumptions of linearity, homoscedasticity, and normally distributed errors.

The interrelationships among emotional intelligence, problem-solving skills, and academic achievement that informed the regression structure are illustrated in **Figure 4a**, which depicts the correlation structure among study variables. As shown in this Figure, emotional intelligence dimensions—particularly managing one's own emotions and managing others' emotions—demonstrated the strongest associations with CGPA, providing empirical justification for their entry as primary predictors in the first regression block. The broader relational structure among predictors, including the strong interconnections between emotional intelligence and problem-solving dimensions, is further visualized in **Figure 4b**, which presents a correlation network that highlights the magnitude and density of associations across constructs.

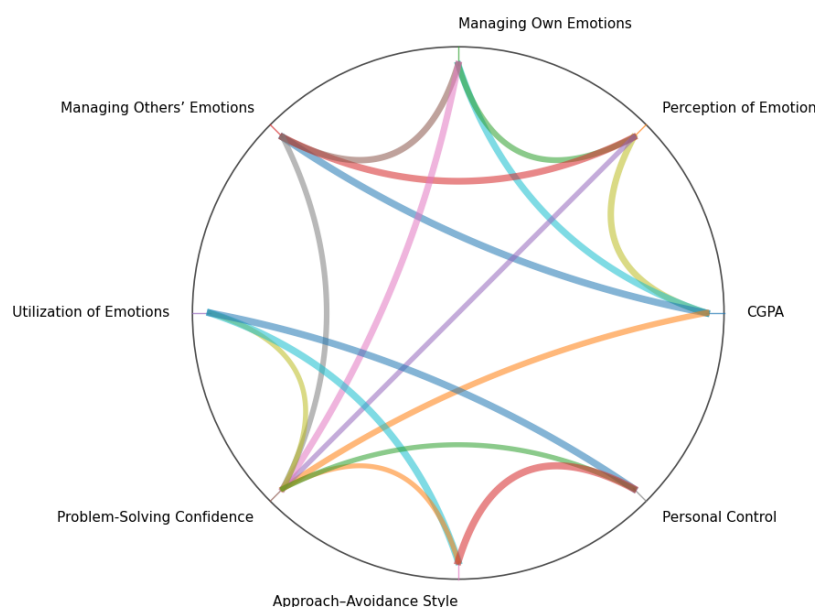


Figure 4a. Correlation Structure among Emotional Intelligence, Problem-Solving Skills, and Academic Achievement (CGPA)

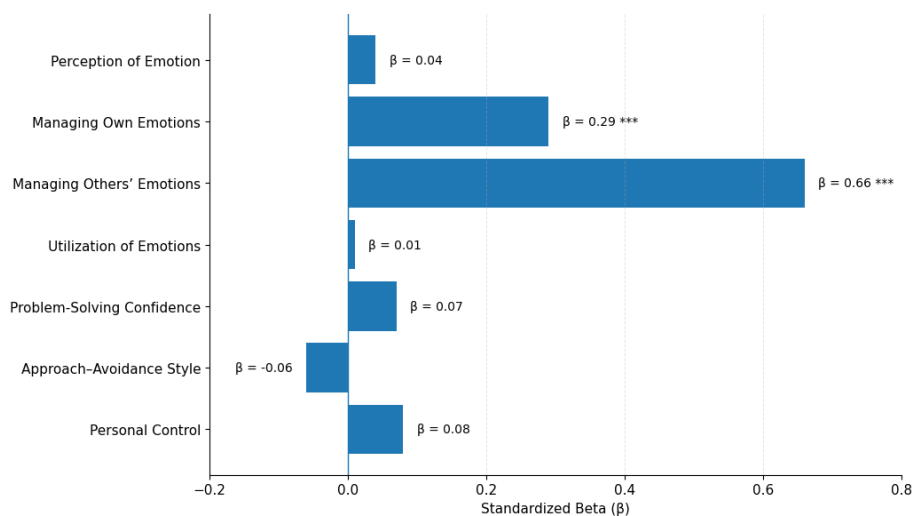


Figure 4b. Network Representation of Interrelationships among Emotional Intelligence Dimensions, Problem-Solving Skills, and Academic Achievement

As reported in Table 3, Model I was statistically significant and accounted for a substantial proportion of variance in academic achievement, explaining 92% of the total variance ($R^2 = .92$, $F(4, 195) = 524.16$, $p < .001$). Examination of standardized regression coefficients revealed that **managing one's own emotions** ($\beta = .29$, $p < .001$) and **managing others' emotions** ($\beta = .66$, $p < .001$) emerged as statistically significant positive predictors

of CGPA. In contrast, **perception of emotion** ($\beta = .04$, ns) and **utilization of emotions** ($\beta = .01$, ns) did not independently predict academic achievement after controlling for other emotional intelligence dimensions. These results indicate that emotional regulation capacities exerted a uniquely strong influence on academic performance beyond emotional awareness or emotional application. In **Model II**, the three problem-solving skill

dimensions—problem-solving confidence, approach–avoidance style, and personal control—were entered into the regression Equation. The overall Model remained statistically significant ($R^2 = .92$, $F(7, 192) = 301.08$, $p < .001$). The addition of problem-solving skills resulted in a **statistically significant but minimal increase in explained variance ($\Delta R^2 = .002$)**, indicating that these variables contributed

little incremental predictive power beyond emotional intelligence. None of the problem-solving dimensions emerged as significant independent predictors of academic achievement when emotional intelligence dimensions were held constant, with standardized beta coefficients remaining small and non-significant.

Table 3: Hierarchical Regression Predicting Academic Achievement (CGPA)

Predictor	ΔR^2	β	F
Model I: Emotional Intelligence	.92***		524.16
Perception of Emotion		.04	
Managing Own Emotions		.29***	
Managing Others' Emotions		.66***	
Utilization of Emotions		.01	
Model II: Problem-Solving Skills	.002***		301.08
Problem-Solving Confidence		.07	
Approach–Avoidance Style		–.06	
Personal Control		.08	
Total R^2	.92***		

Note. *** $p < .001$.

The relative predictive strength of each emotional intelligence and problem-solving variable for academic achievement is summarized in **Figure 4c**, which presents standardized effect estimates and confidence intervals for associations with CGPA. Consistent with the regression findings, managing others' emotions and managing one's own emotions exhibited the largest effect sizes. In contrast, problem-solving dimensions showed comparatively weaker and non-significant effects when modeled concurrently with emotional intelligence. Taken

together, the hierarchical regression results indicate that emotional regulation capacities—rather than general emotional awareness or problem-solving tendencies—constituted the dominant predictors of academic achievement during the COVID-19 pandemic. While problem-solving skills were strongly correlated with CGPA at the bivariate level, their predictive contribution diminished substantially after controlling for emotional intelligence. The final regression structure, reflecting these relationships, is summarized in the emerged predictive research Model

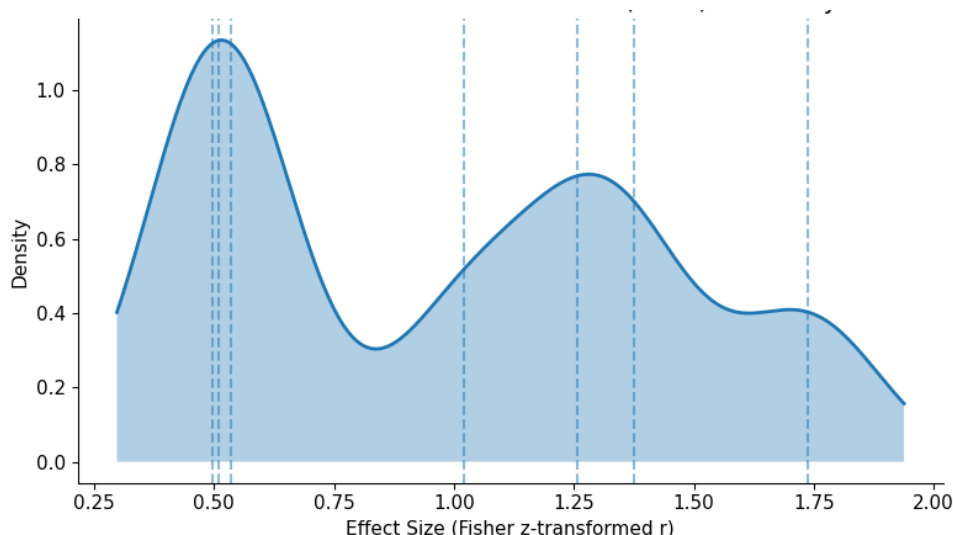


Figure 4c. Density Distribution of Effect Sizes for Associations between Academic Achievement (CGPA) and Study Variables

4.4 Gender Differences in Emotional Intelligence, Problem-Solving Skills, and Academic Achievement

Independent-samples t-tests were conducted to examine gender differences across emotional intelligence dimensions, problem-solving skills, and academic achievement. Preliminary analyses confirmed that the assumptions of normality and homogeneity of variance were satisfied for all dependent variables. As reported in **Table 4**, statistically significant gender differences were observed across all emotional intelligence dimensions. Female students scored significantly higher than male students on perception of emotion, managing own emotions, managing others' feelings, and utilization of emotions, with effect sizes ranging from small to moderate (Cohen's $d = .31-.35$). These results indicate that female students demonstrated greater emotional awareness and regulation during the pandemic period. Significant gender differences

were also observed across all problem-solving dimensions. Female students reported higher problem-solving confidence, more adaptive approach-avoidance styles, and greater personal control compared to male students. Effect sizes for these differences ranged from minor to moderate, indicating consistent but meaningful gender-based disparities in perceived problem-solving competence. In terms of academic achievement, female students attained significantly higher **CGPA** scores than male students ($p < .05$). This finding suggests that gender differences extended beyond psychological attributes to observable academic outcomes during the COVID-19 pandemic. These gender-based differences consistently demonstrate higher mean scores for female students across emotional intelligence, problem-solving skills, and academic achievement.

Table 4: Gender Differences in Study Variables (N = 200)

Variable	Females M(SD)	Males M(SD)	t(df)	p	Cohen's d
Perception of Emotion	2.52 (.87)	2.21 (.95)	2.38	.02*	.34
Managing Own Emotions	2.44 (.73)	2.18 (.77)	2.45	.01**	.35
Managing Others' Emotions	2.45 (.79)	2.17 (.90)	2.33	.02*	.33
Utilization of Emotions	2.29 (.67)	2.08 (.69)	2.23	.03*	.31

Problem-Solving Confidence	2.37 (.74)	2.11 (.75)	2.47	.01**	.35
Approach–Avoidance Style	2.32 (.66)	2.06 (.61)	2.70	.01**	.41
Personal Control	2.32 (.65)	2.05 (.69)	2.76	.01**	.40
CGPA	2.43 (.77)	2.18 (.83)	2.21	.03*	.31

5. Discussion

The present study investigated the relationships among emotional intelligence, problem-solving skills, and academic achievement among Pakistani University students during the COVID-19 pandemic, with additional emphasis on predictive mechanisms and gender differences. The findings provide strong empirical support for the central role of emotional intelligence in academic functioning under crisis conditions and align closely with prior national and international research. The results of the present study demonstrated a strong and positive association between emotional intelligence and academic achievement, particularly for the dimensions of managing one's own emotions and managing others' emotions. These findings are consistent with earlier empirical evidence indicating that emotional intelligence is a significant predictor of academic success across educational levels and cultural contexts (Ahmed et al., 2019; Chamundeswari, 2013; Joibari & Mohammadtaheri, 2011; Joshi et al., 2012; Mohzan et al., 2012; Romanelli et al., 2006; Saud, 2019; Zahed-Babelan & Moenikia, 2010). Specifically, the strong predictive contribution of emotional regulation observed in the present study corroborates the work of Ahmed et al. (2019), who found that emotional intelligence significantly predicted academic achievement among Pakistani management students. Similarly, meta-analytic evidence reported by MacCann et al. (2019) supports the conclusion that emotional intelligence contributes uniquely to academic performance beyond cognitive ability. The current findings further extend this literature by demonstrating that emotional regulation capacities become particularly salient under conditions of heightened academic stress, such as those experienced during the COVID-19 pandemic (Aucejo et al., 2020; Carlson, 2020; Rajhans et al., 2020). The moderate association between utilization of emotions and academic achievement observed in

this study aligns with findings reported by Chamundeswari (2013) and Hanafi and Noor (2016), suggesting that while emotional awareness and regulation are critical, the strategic use of emotions contributes incrementally to academic performance. This distinction is important, as it suggests that not all components of emotional intelligence exert equal influence on academic outcomes, particularly in crisis contexts.

The present study found that problem-solving skills were significantly and positively associated with academic achievement, particularly problem-solving confidence. This finding is consistent with theoretical and empirical work emphasizing the role of cognitive and behavioral coping strategies in academic success (Dostál, 2015; Hunt & Ernst, 1971; Perveen, 2010). Prior studies have similarly reported positive associations between problem-solving ability and academic performance among students (Gupta et al., 2016; Kanmani & Nagarathinam, 2017; Seker & Karakurt, 2020). However, when examined within the hierarchical regression framework, problem-solving skills did not emerge as independent predictors of academic achievement after controlling for emotional intelligence. This pattern suggests that emotional intelligence may operate as a foundational mechanism through which problem-solving skills influence academic performance. This interpretation is supported by findings from Coşkun et al. (2014) and Korkmaz et al. (2019), who reported strong interrelations between emotional intelligence and problem-solving abilities. The current study extends this literature by empirically demonstrating that emotional regulation supersedes problem-solving appraisal in predicting academic achievement during crisis conditions. Additionally, the strong correlations between emotional intelligence dimensions and problem-solving skills observed in the present study are consistent with the theoretical

propositions of Goleman (1995) and Mayer and Salovey (1990), who conceptualized emotional intelligence as integral to adaptive problem-solving and decision-making.

The COVID-19 pandemic introduced unprecedented academic, psychological, and social stressors, profoundly affecting students' engagement, motivation, and performance (Aucejo et al., 2020; Carlson, 2020). The findings of the present study suggest that students with higher emotional intelligence were better equipped to regulate stress, adapt to online learning environments, and maintain academic performance during this period. This conclusion is consistent with recent pandemic-focused studies showing that emotional intelligence buffered emotional distress and promoted adaptive coping during COVID-19 (Korkmaz et al., 2020; Moroń & Biolik-Moroń, 2020). Furthermore, the strong association between emotional intelligence and academic achievement supports the argument that emotional competencies are particularly critical during periods of uncertainty and disruption, when traditional academic structures and supports are compromised (Rajhans et al., 2020; Tam et al., 2021). These findings reinforce the relevance of emotional intelligence as a non-cognitive determinant of academic resilience in higher education.

The present study revealed significant gender differences across all dimensions of emotional intelligence, problem-solving skills, and academic achievement, with female students demonstrating higher scores than male students. These findings are consistent with previous research conducted in Pakistan and other cultural contexts (Fida et al., 2018; Gujjar et al., 2010; Wismath & Zhong, 2014). Specifically, the higher emotional intelligence scores observed among female students align with the findings of Fida et al. (2018), who reported greater emotional awareness and regulation among female University students. Similarly, the superior problem-solving confidence and personal control reported by female students are consistent with the work of Dindar (2018) and Wismath and Zhong (2014), who identified gender-based differences in problem-solving perceptions and academic engagement. The higher academic achievement observed among female students in the present study also converges

with prior evidence linking emotional competencies and self-regulatory skills to academic success (Aryana, 2010; Fathei, 2006; Jenaabadi, 2018). These gender-based patterns may reflect differential socialization processes, emotional expressiveness, and coping strategies, which appear to confer academic advantages to female students during crisis conditions.

Overall, the findings of the present study are largely congruent with existing literature emphasizing the central role of emotional intelligence in academic achievement (Ahmed et al., 2019; Goleman, 1995; MacCann et al., 2019; Romanelli et al., 2006). The study extends prior research by demonstrating that emotional regulation capacities exert a dominant influence on academic performance when students are exposed to prolonged stress and uncertainty, such as during the COVID-19 pandemic. In contrast, while problem-solving skills remain important correlates of academic achievement, their predictive contribution appears secondary to emotional intelligence in crisis contexts. This nuanced distinction contributes to the literature by clarifying the hierarchical relationship between emotional and cognitive coping mechanisms in academic settings.

6. Study Limitations

Despite the significant contributions of the present study, several limitations should be acknowledged. First, the study relied on self-report measures for assessing emotional intelligence and problem-solving skills. Although the instruments used demonstrated strong reliability, self-report data are subject to social desirability bias and individual differences in self-perception, which may have influenced participants' responses (Schutte & Malouff, 2002; Soliman, 2014).

Second, the length of the questionnaires posed a practical limitation, as some participants exhibited reluctance or fatigue while completing the measures. This may have affected response accuracy despite excluding incomplete or random responses.

Third, the use of a purposive sampling technique and the inclusion of students primarily from non-medical and non-engineering disciplines limit the generalizability of the findings. Students from medical and engineering programs often experience different academic stressors and learning

environments; therefore, the results cannot be generalized to these populations without caution. Finally, the cross-sectional design of the study restricts causal inference. Although significant associations and predictive relationships were identified, the temporal direction of these relationships cannot be established with certainty.

7. Future Directions

Future research should adopt longitudinal designs to examine the developmental trajectories of emotional intelligence and problem-solving skills and their long-term impact on academic achievement. Longitudinal approaches would allow researchers to determine causal pathways and examine how emotional competencies evolve across academic stages. Further studies should also include students from diverse academic disciplines, particularly medical, engineering, and technical fields, to enhance the generalizability of findings across higher education contexts. Additionally, incorporating mixed-method approaches—such as qualitative interviews or observational assessments—may provide deeper insight into how emotional intelligence and problem-solving skills are applied in real academic settings. Experimental and intervention-based research is also recommended to evaluate the effectiveness of emotional intelligence training and problem-solving skill development programs in improving academic outcomes. Such interventions may be particularly beneficial during periods of academic disruption or crisis, as suggested by previous research. Finally, future research should consider the role of contextual variables such as socio-economic status, family support, instructional quality, and institutional resources, which may interact with emotional intelligence and problem-solving skills to influence academic achievement.

8. Practical and Educational Implications

The findings of the present study carry important implications for higher education policy and practice in Pakistan. Traditionally, the Pakistani education system has emphasized rote memorization and examination-based performance, with limited attention given to students' emotional development and coping skills. The current findings highlight the need to broaden educational priorities beyond

CGPA-focused outcomes. Educational institutions should integrate the development of emotional intelligence into University curricula through workshops, seminars, self-awareness programs, and counseling services. Collaborative efforts between educators and psychologists can help students develop emotional regulation, resilience, and adaptive problem-solving skills, which are essential for academic success, particularly during periods of uncertainty and stress. Moreover, training programs that enhance problem-solving skills may foster critical thinking, creativity, and independent learning—qualities essential for academic and professional success in the modern era. By prioritizing emotional and cognitive competencies alongside academic content, universities can promote holistic student development and improve academic outcomes across diverse student populations.

9. Conclusion

In conclusion, the present study provides comprehensive empirical evidence highlighting the critical role of emotional intelligence and problem-solving skills in shaping academic achievement among Pakistani University students during the unprecedented circumstances of the COVID-19 pandemic. The findings demonstrated that emotional intelligence, particularly the abilities to manage one's own emotions and effectively respond to the emotions of others, was strongly associated with and emerged as the most robust predictor of academic achievement, underscoring the importance of emotional regulation in maintaining academic performance under conditions of heightened stress and disruption. Problem-solving skills also exhibited significant positive relationships with academic achievement, indicating that students who perceived themselves as confident, adaptive, and in control of problem situations were better equipped to navigate academic challenges during the pandemic. Furthermore, the presence of consistent gender differences, with female students exhibiting higher emotional intelligence, stronger problem-solving skills, and superior academic performance, emphasizes the influence of emotional and self-regulatory competencies on academic outcomes across demographic groups. Collectively, these findings reinforce the notion that academic success is

not solely determined by cognitive ability or rote learning, but is substantially influenced by emotional and psychological competencies, particularly during crisis contexts. The study thus advocates for a paradigm shift within higher education in Pakistan toward the systematic integration of emotional intelligence and problem-solving skill development into academic curricula and student support services, as fostering these competencies may enhance academic resilience, promote holistic student development, and better prepare students to succeed in both academic and real-world challenges beyond the pandemic.

Author Contributions

Zohaa Ajmal conceptualized the study, designed the research framework, conducted data collection and statistical analysis, and prepared the original draft of the manuscript. Zara Haroon contributed to the study design, supervised the research process, critically reviewed the manuscript, and provided intellectual guidance throughout the study. Muntahaa Ajmal assisted in literature review, data interpretation, and manuscript editing. All authors read and approved the final version of the manuscript.

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Institutional Review Board Statement (Ethical Approval)

The study was conducted in accordance with the ethical standards set out in the Declaration of Helsinki. Ethical approval for the study was obtained from the Departmental Research Ethics Committee of the Department of Applied Psychology, Kinnaird College for Women, Lahore, Punjab, Pakistan.

Informed Consent Statement

Informed consent was obtained from all participants prior to data collection. Participants were informed of the purpose of the study, the voluntary nature of participation, the confidentiality of their responses, and their right to withdraw at any stage without penalty.

Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to ethical and institutional guidelines.

Conflicts of Interest

The authors declare no conflict of interest.

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