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Who Learns Chemistry Better? Exploring the Role of Resilience and Emotional Intelligence

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Abstract

This study investigated the relationship between emotional intelligence (EI) and resilience among chemistry teachers in Pakistan, examining the effects of demographic variables including gender, teaching experience, locale, and age. Using a quantitative, correlational design, data were collected from 414 chemistry teachers in Lahore via the Siddique & Shabbir Chemistry Resilience Scale (S&S-CRISC) and the Emotional Intelligence Scale (EIS). Pearson correlation results revealed a strong positive relationship between EI and resilience ($r = .856, p < .001$). Regression analysis showed that EI significantly predicted resilience, accounting for 73.2% of its variance ($\beta = .856, p = .001$). Independent sample t-tests indicated significant gender differences, with male teachers scoring higher on both EI and resilience, and significant locale differences for resilience favoring rural teachers. One-way ANOVA results demonstrated significant differences in EI and resilience by teaching experience, but not by age. Findings align with international and national literature, underscoring EI as a key contributor to resilience in the teaching profession. The study highlights the importance of integrating EI training into teacher development programs to enhance resilience, job satisfaction, and educational effectiveness. Further researches may be conducted by adding the one or more variable adopting the mixed-methods or qualitative approach.

Introduction

Resilience and emotional intelligence are two crucial constructs that have gained significant attention in the field of education and psychology (Siddique, 2025). Resilience refers to an individual's ability to bounce back from adversity and cope with stress (Siddique et al., 2021), while emotional intelligence refers to the ability to recognize and manage emotions in oneself and others (Siddique et al., 2024). In the context of teaching, these constructs have been found to be critical predictors of teacher well-being, job satisfaction, and effectiveness (Acconito et al., 2024; Al Halbusi, 2023; Campbell-Sills & Stein, 2007; Fatima, 2024; Khan & Khanlou, 2021; Lawrie, 2021; Masten, 2014; Năstăsă et al., 2022; Wang & Gordon, 2012; Yang & Wang, 2022).



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Chemistry teachers play a critical role in the education system, as they provide students with essential skills and knowledge in the sciences. However, chemistry teachers in Pakistan may face numerous challenges, including heavy workloads, poor working conditions, and inadequate support systems, which can impact their well-being and job performance (Siddique et al., 2023; Siddique et al., 2021). Thus, exploring the relationship between resilience and emotional intelligence in chemistry teachers is critical for understanding the factors that impact their well-being and job effectiveness.

Researches have shown that resilience is positively correlated to emotional intelligence in teachers (Abdolrezapour et al., 2023; Gause et al., 2024; Moreno-Hernandez & Mondisa, 2021; Supervía et al., 2022). Furthermore, interventions aimed at enhancing teachers' resilience and emotional intelligence have been found to be effective in improving teacher well-being and job satisfaction (Chenani, 2020; Prince-Embury & Saklofske, 2012; Vescio, 2016; Wang et al., 2023). Thus, exploring the relationship between resilience and emotional intelligence among chemistry teachers in Pakistan is critical for informing policy and practice aimed at enhancing teacher well-being and effectiveness.

Research Gap

Although prior studies in Pakistan have examined the relationship between resilience and emotional intelligence among various populations, including students and teachers in general (Ali & Ahmad, 2017; Ali et al., 2019; Khan & Iqbal, 2017; Shuja & Khan, 2019; Khan & Awan, 2021; Riaz et al., 2021), empirical evidence specifically addressing the effect of resilience on emotional intelligence among chemistry teachers remains scarce. This paucity of targeted research constitutes a notable gap in the literature. Given the pivotal role chemistry teachers play in shaping both the academic and emotional development of their students, understanding this relationship is of critical importance. The teaching profession in Pakistan, particularly within the domain of science education, is characterized by multiple occupational stressors, including excessive workload, inadequate remuneration, insufficient resources, and sociocultural pressures. Such factors may adversely influence teachers' emotional well-being, resilience, and capacity for effective emotional regulation.

Investigating the interplay between resilience and emotional intelligence within this professional group can yield actionable insights for the design of interventions aimed at strengthening emotional competencies, thereby enhancing job satisfaction, psychological well-being, and instructional effectiveness. Furthermore, examining this relationship in the specific sociocultural and institutional context of Pakistan may uncover unique facilitators and barriers to resilience development, informing both policy and practice. Consequently, addressing this gap is essential to advancing scholarly understanding and to developing empirically grounded strategies for fostering emotionally intelligent and resilient educators in the field of chemistry.

Rationale of the Study

The investigation of the effect of resilience on emotional intelligence among chemistry teachers in Pakistan is critical for several reasons. First, understanding how resilience shapes emotional intelligence can inform the development of targeted strategies to strengthen teachers' emotional competencies, thereby



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enhancing their ability to manage emotions, cope with stress, and maintain well-being. Second, given that emotional intelligence is a significant predictor of professional effectiveness and that resilience is a key antecedent of emotional intelligence, examining their relationship can guide interventions aimed at improving teacher performance and student outcomes. Third, the unique sociocultural and occupational context in Pakistan—characterized by cultural conformity pressures, financial constraints, and high work demands—presents distinct challenges to teachers' emotional well-being and resilience. Finally, despite the established importance of both constructs, there remains a paucity of empirical evidence specifically addressing their interaction among chemistry teachers in Pakistan. Addressing this gap will not only enrich the national literature but also provide context-specific insights with implications for teacher development, educational policy, and professional support systems.

Statement of the Problem

There is a clear need to investigate the effect of resilience on emotional intelligence among chemistry students in Pakistan. Resilience, defined as the capacity to recover and adapt in the face of stressors, and emotional intelligence, defined as the ability to perceive, understand, and manage one's own emotions as well as those of others, are both critical for academic and personal success. This study seeks to examine how resilience influences emotional intelligence, considering demographic variables such as gender, academic level, and socio-economic status. Understanding this relationship can inform the development of targeted strategies to enhance emotional intelligence, equipping students with essential skills including self-awareness, self-regulation, motivation, empathy, and social competence. Given that chemistry students in Pakistan often contend with academic pressure, financial constraints, and cultural expectations, this investigation will not only fill a gap in the existing literature but also provide context-specific insights to support students' emotional well-being and academic performance. So, the objectives of the study were to:

- Determine the relationship between resilience and emotional intelligence among chemistry teachers.
- Assess the effect of resilience on emotional intelligence among chemistry teachers.

Literature Review

Research has shown that resilience and emotional intelligence are positively related, with more resilient individuals demonstrating higher levels of emotional intelligence (Lucero, 2021; Morales Rodriguez et al., 2020; Ngui & Lay, 2020). This relationship has been observed across various populations, including university students (Lucero, 2021), healthcare professionals (Morales Rodriguez et al., 2020), and teachers (Conte, 2005).

In the context of teaching, resilience and emotional intelligence have been found to be important predictors of teacher well-being and job satisfaction. Teachers who are more resilient are better able to cope with the demands of the job and maintain positive emotional states (Collado-Soler et al., 2023). Similarly, teachers with higher levels of emotional intelligence are better able to manage their own emotions and those of their students, resulting in better classroom management and higher student achievement (Abualruz et al., 2024) Pakistan is a



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country with a complex cultural context and unique challenges in the education system, including limited resources and high student-teacher ratios (Ali et al., 2023). Despite these challenges, research has shown that resilience is an important factor in the well-being of teachers in Pakistan (Ahmad et al., 2019). However, there is a paucity of research on the relationship between resilience and emotional intelligence among teachers in Pakistan. A study was conducted in Pakistan to examine the relationship between emotional intelligence and job satisfaction among university teachers (Nizam et al., 2024). The study found that emotional intelligence was a significant predictor of job satisfaction, indicating the importance of emotional intelligence in the teaching profession in Pakistan. Another study conducted in Iran explored the relationship between resilience and emotional intelligence among teachers in primary schools (Joulaei et al., 2022). The study found that resilience was positively related to emotional intelligence, suggesting that teachers with higher levels of resilience may be better able to manage their own emotions and those of their students.

Given the limited research on resilience and emotional intelligence among teachers in Pakistan, further investigation is warranted. The proposed study seeks to fill this gap by exploring the relationship between resilience and emotional intelligence among chemistry teachers in Pakistan. It is hypothesized that resilience will positively impact emotional intelligence, with stress mediating this relationship. Teaching experience is proposed as a moderating variable, and culture is a contextual variable that may influence the relationship between resilience and emotional intelligence. The findings of this study may have important implications for teacher training and professional development programs in Pakistan, ultimately leading to improved teacher well-being and student outcomes.

To further support the proposed study, previous research has highlighted the importance of resilience and emotional intelligence in the teaching profession. For example, Jennings and Greenberg (2009) found that teachers who participated in a mindfulness-based stress reduction program reported lower levels of stress and higher levels of emotional regulation, resulting in improved classroom behavior and academic performance among their students. Similarly, Conte (2005) found that emotional intelligence was positively associated with teacher well-being and job satisfaction. Teachers who were able to regulate their emotions and respond effectively to their students' emotions reported higher levels of job satisfaction and lower levels of burnout.

In addition, research has shown that teaching experience can influence the relationship between resilience and emotional intelligence. For example, Schneider et al. (2013) found that experienced teachers demonstrated higher levels of resilience and emotional intelligence compared to novice teachers. This suggests that teaching experience may serve as a protective factor against stress and burnout among teachers. Finally, the cultural context in Pakistan may also influence the relationship between resilience and emotional intelligence among teachers. Pakistan is a collectivist society where interpersonal relationships and social harmony are highly valued (Ahmad & Ali, 2019). This cultural context may influence how teachers perceive and manage stress and emotions in the classroom, and how they interact with their students and colleagues.

Overall, the literature suggests that resilience and emotional intelligence are important factors in teacher well-being and job satisfaction, and may have



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important implications for student outcomes. The proposed study on the relationship between resilience and emotional intelligence among chemistry teachers in Pakistan seeks to contribute to the existing literature and inform teacher training and professional development programs in the country.

Table 1: *Tabular form of International research studies on resilience and emotional intelligence*

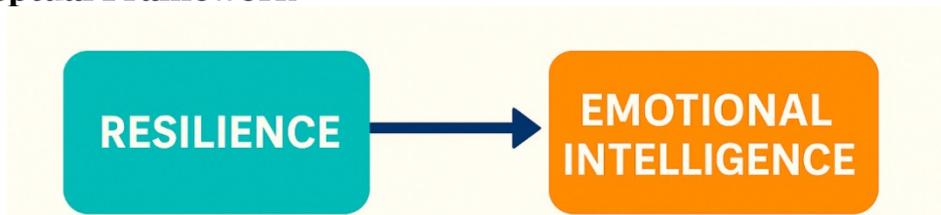
Sr#	Research Study	Country	Sample	Research Findings	Reference
1	Relationship between emotional intelligence and resilience among healthcare workers	Canada	122 nurses, 97 physicians, and 64 support staff in a hospital setting	Positive correlation between emotional intelligence and resilience; both were significant predictors of work engagement and job satisfaction	Kaur et al., 2018
2	Resilience and emotional intelligence in military personnel	United States	206 service members (Army, Air Force, Navy, and Marines)	Positive correlation between resilience and emotional intelligence; both were significant predictors of mental health outcomes	Bartone et al., 2019
3	Association between emotional intelligence, resilience, and burnout in healthcare professionals	Iran	240 healthcare professionals (nurses and physicians)	Positive correlation between emotional intelligence and resilience; both were negatively correlated with burnout	Ghorbanzadeh et al., 2021
4	Relationship between emotional intelligence, resilience, and job satisfaction in teachers	Turkey	321 teachers (primary and secondary)	Positive correlation between emotional intelligence and resilience; both were significant predictors of job satisfaction	Köroğlu & Akdağ, 2020
5	Influence of resilience and emotional intelligence on well-being in university students	China	474 university students	Positive correlation between resilience and emotional intelligence; both were significant predictors of well-being	Sun et al., 2021
6	Relationship between emotional intelligence, resilience, and job performance in healthcare professionals	Oman	255 healthcare professionals (nurses, physicians, and allied health staff)	Positive correlation between emotional intelligence and resilience; both were significant predictors of job performance	Al-Kindi et al., 2020



Table 2: *Tabular form of Research Studies on Resilience and Emotional Intelligence in Pakistan*

Sr#	Authors & Years	Participants	Findings
1	Ali & Ahmad (2017)	Secondary school teachers	Emotional intelligence was positively related to job satisfaction
2	Ali et al. (2019)	University students	Emotional intelligence was a significant predictor of academic achievement
3	Khan & Iqbal (2017)	School teachers	Teachers with higher levels of resilience reported lower levels of stress
4	Shuja & Khan (2019)	Public and private teachers	Emotional intelligence was positively related to job satisfaction
5	Khan & Awan (2021)	Secondary school teachers	Emotional intelligence was a significant predictor of teacher effectiveness
6	Riaz et al. (2021)	Teachers	Resilience was a significant predictor of job satisfaction and a negative predictor of burnout

Conceptual Framework



Methodology

The present study was grounded in the positivist paradigm, employing a quantitative correlational research design to investigate the relationship between resilience and emotional intelligence among chemistry teachers in Pakistan. This design was selected as it allows for the measurement of the strength and direction of associations between variables without manipulating the study environment, thereby preserving the natural context of the participants’ experiences.

The target population comprised all chemistry teachers working in Pakistan, while the accessible population included all chemistry teachers from District Lahore. The accessible population was chosen due to logistical feasibility while ensuring adequate representation of the target group. A non-probability sampling strategy, specifically random sampling within the accessible population, was utilized to recruit participants.

The required sample size was calculated using G*Power 3.1 software, setting an effect size of 0.50, a statistical power of 0.80, and a significance level (α) of 0.05. The computation indicated a minimum of 414 participants, which was achieved in this study. This sample size ensured sufficient statistical power for detecting meaningful relationships while maintaining external validity.

Two standardized instruments were employed firstly, Siddique and Shabbir Chemistry Resilience Scale (S&S-CRISC) (Siddique, 2025), This scale was developed to measure resilience specifically in the context of chemistry educators. It assesses the ability to adapt, recover from challenges, and sustain performance under occupational stress. Previous research has established its internal consistency (Cronbach’s $\alpha > 0.85$) and construct validity within educational



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settings. Secondly, Emotional Intelligence Scale (EIS) by Shi and Wang (2007), This widely used instrument measures four core dimensions of emotional intelligence: self-emotion appraisal, others' emotion appraisal, use of emotion, and regulation of emotion. The EIS has demonstrated strong psychometric properties, with reported Cronbach's α values exceeding 0.80 across subscales. Both instruments were administered in their original validated forms to ensure reliability and comparability with previous research findings.

Permission was obtained from relevant institutional authorities, and informed consent was secured from all participants prior to data collection. Questionnaires were distributed in person and collected upon completion to maximize response rates. Confidentiality and anonymity were maintained throughout the process. Data were analyzed using SPSS (Version-26). Descriptive statistics (means, standard deviations, frequencies) were computed to summarize demographic variables and scale scores. Pearson's product-moment correlation coefficient was used to examine the relationship between resilience and emotional intelligence. Simple linear regression analysis was conducted to determine the predictive effect of emotional intelligence on resilience. Additionally, independent samples t-tests and one-way ANOVA were performed to assess differences in resilience and emotional intelligence across gender, locale, teaching experience, and age groups. Statistical significance was set at $p < 0.05$ for all analyses.

Table 3: *Correlation between Emotional Intelligence and Teachers' Resilience*

Variables	<i>N</i>	<i>r-value</i>	<i>Sig.</i>
Emotional Intelligence and Resilience	414	.856**	.000

** $p < .001$ (2-tailed)

Table 3 revealed the correlation between teachers' emotional intelligence and resilience. It was concluded that emotional intelligence was having strong relation with teachers' resilience, $r = .856^{***}$, $n = 414$, $p < .001$.



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Table 4: *Effect of Emotional Intelligence on Teachers’ Resilience*

Variables	B	t-value	Sig.	R ²
Emotional Intelligence & Resilience	.856	33.625	.001	.732

Table 4 illustrated that linear regression results, the R² value (.732) explained the variance in the criterion due to the predictor. So, the variance in teachers’ resilience is (73.2%) due to emotional intelligence. The beta value (.856) is significant with $p = .001$. The results indicated the strong significant effect of emotional intelligence on teachers’ resilience with β value .856 at $p = .001$.

Table 5: *Gender Wise Comparison in Emotional Intelligence and Teachers’ Resilience*

Variables	Gender	N	M	SD	t-value	df	p-value
Emotional Intelligence	Male	221	137.5928	17.20509	1.799	371.438	.000
	Female	193	134.1658	21.01917			
Resilience	Male	221	71.2398	9.43598	2.078	372.774	.000
	Female	193	69.0777	11.45322			

Table 5 showed that an “independent sample t-test” was run for comparison mean scores of emotional intelligence and teachers’ resilience concerning their gender. It was concluded that emotional intelligence and teachers’ resilience had a significant difference at $p = .05$.

Table 6: *Locale Wise Comparison in Emotional Intelligence and Teachers’ Resilience*

Variables	Locale	N	M	SD	t-value	df	p-value
Emotional Intelligence	Rural	192	137.9115	18.44952	1.910	409.007	.258
	Urban	222	134.3378	19.59218			
Resilience	Rural	192	71.1979	9.52057	1.771	411.910	.006
	Urban	222	69.3964	11.17713			

Table 6 showed that an “independent sample t-test” was run for comparison mean scores of emotional intelligence and teachers’ resilience concerning their locale. It was concluded that teachers’ resilience had a significant difference at $p = .05$.

Table 7: *One-way ANOVA on Emotional Intelligence and Teachers’ Resilience based on Teaching Experience*

Variables	Sum of Squares	df	Mean Square	F	Sig.
Emotional Intelligence	5124.771	5	1024.954	2.864	.015
	Error	146035.220	408		
Resilience	151159.990	413	375.539	3.532	.004
	Error	43378.045	408		
	45255.739	413			

Table 7 revealed the outcomes of a one-way analysis of variance concerning teaching experience in years. The results indicated that both variables such as emotional intelligence and teachers’ resilience had a significant difference in teachers’ teaching experience.



Table 8: *One-way ANOVA on Emotional Intelligence and Teachers’ Resilience based on Age Ranges*

Variables	Sum of Squares	df	Mean Square	F	Sig.
Emotional Intelligence	1320.420	3	440.140		
Error	149839.571	410	365.462	1.204	.308
	151159.990	413			
Resilience	799.864	3	266.621		
Error	44455.875	410	108.429	2.459	.062
	45255.739	413			

One-way ANOVA was performed to compare mean scores of emotional intelligence and resilience concerning teachers’ age ranges in table 8. It was concluded that teachers were not having difference in mean scores of emotional intelligence and resilience based on their age ranges.

Discussion and Conclusion

The present study aimed to examine the relationship between emotional intelligence and resilience among teachers, with a particular focus on the predictive effect of emotional intelligence on resilience. The findings revealed a strong, positive, and statistically significant correlation between emotional intelligence and teachers’ resilience ($r = .856, p < .001$), indicating that higher levels of emotional intelligence are associated with higher levels of resilience. The regression analysis further demonstrated that emotional intelligence is a substantial predictor of resilience, accounting for 73.2% of the variance in resilience scores ($\beta = .856, p = .001$). This magnitude of association suggests that emotional intelligence is not merely related to resilience but is a major contributing factor to its development among teachers.

These findings are consistent with a wide body of international research. For instance, Kaur et al. (2018) and Al-Kindi et al. (2020) found that emotional intelligence and resilience were positively correlated among healthcare professionals, with both variables predicting key work-related outcomes such as engagement, satisfaction, and performance. Similarly, Köroğlu and Akdağ (2020) in Turkey and Sun et al. (2021) in China confirmed that emotional intelligence and resilience together significantly influence well-being and job satisfaction in educational and student populations. The strong relationships found in these studies resonate with the current results, reinforcing the universal nature of this association across occupational contexts and cultural backgrounds.

From a national perspective, the results align with previous Pakistani research. Studies by Ali & Ahmad (2017), Shuja & Khan (2019), and Khan & Awan (2021) consistently reported that emotional intelligence is linked with positive professional outcomes, including job satisfaction and teacher effectiveness. Furthermore, Riaz et al. (2021) observed that resilience serves as a predictor of job satisfaction and a protective factor against burnout. While prior Pakistani studies tended to examine emotional intelligence and resilience separately or in relation to other outcomes, the present study uniquely demonstrates their direct and robust association within a single model, thereby bridging a gap in the local literature.

The effect size found in this study is notably high, suggesting that emotional intelligence may play a more dominant role in fostering resilience among teachers



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than previously documented. One possible explanation lies in the emotionally demanding nature of the teaching profession in Pakistan, where educators frequently face large class sizes, limited resources, and sociocultural pressures. Teachers with higher emotional intelligence may be better equipped to regulate emotions, maintain motivation, and adapt constructively to stressors—skills that directly enhance resilience.

These results also support the broader theoretical framework in which emotional intelligence is viewed as a foundational capacity that underpins adaptive coping mechanisms, enabling individuals to navigate adversity effectively. Resilience, in turn, acts as a mediator in sustaining professional performance and psychological well-being, as evidenced in both local and international contexts.

In conclusion, the present study not only confirms the positive and predictive relationship between emotional intelligence and resilience but also emphasizes the strength of this relationship in the teaching profession. The implications are clear: fostering emotional intelligence through targeted training and professional development could significantly enhance teachers' resilience, ultimately improving job satisfaction, retention, and educational outcomes.

Future Directions

The study on the effect of resilience on emotional intelligence among chemistry teachers in Pakistan can lead to several future research directions. Here are some potential avenues for further investigation:

- Conduct longitudinal studies to explore how resilience and emotional intelligence (EI) develop over time and influence teaching quality and student outcomes.
- Perform comparative studies to assess cross-cultural differences in resilience and EI among chemistry teachers in Pakistan and other countries.
- Design and evaluate intervention programs (e.g., training, mentoring, coaching) aimed at enhancing resilience and EI in chemistry teachers.
- Use mixed-methods research to integrate data from interviews, focus groups, and observations for a comprehensive analysis of resilience and EI.
- Examine the relationship between resilience, EI, and additional factors such as teaching experience, job satisfaction, and burnout.
- Extend research to other teacher groups (e.g., mathematics, English) to compare resilience and EI across subject domains.
- Explore the impact of different populations and sample sizes to improve the generalizability of findings.



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