



Cognitive Flexibility and Self-Beliefs: The Mediating Role of Personality Traits among University Students

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ABSTRACT

Cognitive flexibility is an essential psychological ability that enables individuals to adapt their thinking and behavior in response to changing academic and social demands. It plays a significant role in developing positive self-beliefs, including self-esteem and self-efficacy. The present study examined the mediating role of personality traits in the relationship between cognitive flexibility and self-beliefs among university students. A quantitative cross-sectional correlational research design was employed. Data were collected from 300 university students at the University of Sargodha using stratified random sampling. Standardized instruments, including the Cognitive Flexibility Scale, Rosenberg Self-Esteem Scale, General Self-Efficacy Scale, and Big Five Personality Traits Scale, were used for data collection. Data were analyzed using SPSS Version 27 through descriptive statistics, Pearson Product-Moment correlation, and Hayes' PROCESS Macro (Model 4). The findings revealed that cognitive flexibility was positively associated with self-esteem, self-efficacy, and adaptive personality traits. Moreover, personality traits significantly mediated the relationship between cognitive flexibility and self-beliefs, indicating that students with greater cognitive flexibility were more likely to develop adaptive personality characteristics that enhanced their self-esteem and self-efficacy. The study concludes that fostering cognitive flexibility and positive personality development may strengthen students' self-beliefs and support their academic success and psychological well-being.

Introduction

Cognitive flexibility has become an essential psychological construct in higher education because it enables individuals to adapt their thinking, modify behavioral responses, and cope effectively with changing academic and social demands. University students encounter numerous challenges,

including academic pressure, technological advancements, and complex decision-making situations, all of which require flexible thinking and adaptive problem-solving abilities. Students with higher cognitive flexibility are more capable of considering multiple perspectives, generating alternative solutions, and adjusting their responses according to situational demands, thereby promoting successful academic and personal development.

Self-beliefs represent individuals' perceptions and evaluations of their own abilities and worth and play a vital role in determining motivation, persistence, and academic achievement. Self-beliefs primarily encompass self-esteem and self-efficacy. Self-esteem reflects an individual's overall sense of self-worth, whereas self-efficacy refers to one's confidence in successfully performing specific tasks. Students possessing positive self-beliefs demonstrate greater resilience, stronger motivation, higher academic engagement, and better psychological well-being. Conversely, weak self-beliefs are associated with increased stress, anxiety, and poor academic performance.

Personality traits are another important determinant of students' psychological functioning and educational outcomes. The Big Five Personality Model, consisting of openness, conscientiousness, extraversion, agreeableness, and neuroticism, provides a comprehensive framework for understanding individual differences. Adaptive personality traits, such as openness, conscientiousness, extraversion, and agreeableness, facilitate effective learning, emotional regulation, and social adjustment, whereas neuroticism is generally associated with emotional instability and reduced psychological well-being. These personality characteristics may explain how cognitive flexibility influences students' perceptions of themselves and their capabilities.

Previous research has demonstrated positive relationships between cognitive flexibility and self-esteem, self-efficacy, psychological well-being, and academic adjustment. Similarly, adaptive personality traits have been found to enhance both cognitive functioning and positive self-beliefs. However, limited empirical evidence has examined whether personality traits function as a mediating mechanism through which cognitive flexibility influences self-beliefs, particularly among university students in Pakistan. This gap highlights the need to investigate the indirect pathways linking these psychological constructs.

The present study addresses this gap by examining the mediating role of personality traits in the relationship between cognitive flexibility and self-beliefs among university students at the University of Sargodha. Drawing upon Bandura's Social Cognitive Theory and the Big Five Personality Trait Model, the study investigates whether cognitive flexibility directly enhances self-esteem and self-efficacy and whether this relationship is explained by individual differences in personality traits. The findings are expected to contribute to the existing literature by providing empirical evidence regarding the psychological mechanisms underlying students' self-beliefs and by offering practical implications for educators, counselors, and higher education institutions seeking to promote students' academic success and psychological well-being.

Literature Review

Cognitive flexibility refers to an individual's ability to modify thinking patterns, adapt to changing situations, and generate alternative solutions when confronted with new or challenging circumstances. It is considered a core component of executive functioning that enables individuals to respond effectively to academic, social, and emotional demands. Students with higher cognitive flexibility are better able to integrate new information, solve problems creatively, and regulate their thoughts and behaviors in dynamic learning environments. Previous studies have shown that cognitive flexibility contributes positively to academic achievement, resilience, decision-making, and psychological well-being. Individuals who exhibit greater cognitive flexibility are more likely to adjust successfully to educational challenges and maintain positive attitudes toward learning.

Self-beliefs represent individuals' perceptions and evaluations of their own abilities and personal worth. Two important dimensions of self-beliefs are self-esteem and self-efficacy. Self-esteem reflects an individual's overall evaluation of self-worth, whereas self-efficacy refers to one's confidence in successfully performing specific tasks and overcoming challenges. Positive self-beliefs promote motivation, persistence, academic engagement, and emotional well-being. In contrast, low self-esteem and poor self-efficacy are associated with stress, anxiety, reduced academic performance, and decreased psychological adjustment. Research has consistently demonstrated that students possessing stronger self-beliefs are more likely to achieve academic success and cope effectively with stressful situations.

Personality traits are relatively stable patterns of thoughts, emotions, and behaviors that influence how individuals interact with their environment. The Big Five Personality Model identifies five broad personality dimensions: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Openness is associated with curiosity and willingness to explore new ideas; conscientiousness reflects responsibility, organization, and self-discipline; extraversion represents sociability and positive emotionality; agreeableness emphasizes cooperation and empathy; whereas neuroticism is characterized by emotional instability and negative emotional experiences. Previous studies indicate that adaptive personality traits positively influence academic performance, psychological well-being, and interpersonal relationships, whereas higher levels of neuroticism are generally associated with poorer psychological adjustment and lower self-beliefs.

Existing literature suggests that cognitive flexibility plays a significant role in strengthening students' self-beliefs by enabling them to adapt effectively to academic and personal challenges. Flexible thinkers are more likely to interpret difficulties as opportunities for learning, thereby enhancing both self-esteem and self-efficacy. Similarly, personality traits influence how individuals perceive themselves and respond to environmental demands. Adaptive personality traits, including openness, conscientiousness, extraversion, and agreeableness, are positively associated with confidence, motivation, and academic engagement, whereas neuroticism often predicts lower self-esteem and weaker self-efficacy. Recent research has also suggested that personality traits may serve as an important psychological mechanism linking cognitive flexibility with positive self-beliefs, although empirical evidence remains limited.

The present study is grounded in Bandura's Social Cognitive Theory (1986) and the Big Five Personality Trait Model developed by Costa and McCrae (1992). Social Cognitive Theory proposes that individuals' beliefs about their capabilities influence their behaviors, motivation, and performance. Within this framework, cognitive flexibility enables students to regulate their thinking and adapt to challenging situations, thereby strengthening their self-beliefs. The Big Five Personality Trait Model explains stable individual differences that shape behavioral and emotional responses. Integrating these theoretical perspectives provides a comprehensive explanation of how cognitive flexibility contributes to self-beliefs directly and indirectly through personality traits.

Overall, the reviewed literature indicates that cognitive flexibility, personality traits, and self-beliefs are closely interconnected. However, insufficient empirical evidence exists regarding the mediating role of personality traits among university students in Pakistan. Therefore, the present study seeks to address this gap by examining whether personality traits mediate the relationship between cognitive flexibility and self-beliefs, thereby contributing to the existing body of knowledge and offering practical implications for higher education.

Methodology

Research Design

The present study employed a quantitative cross-sectional correlational research design to examine the relationship between cognitive flexibility and self-beliefs and to investigate the mediating role of personality traits among university students. This design was considered appropriate because it enabled the researcher to examine the associations among the study variables and test the proposed mediation model using statistical techniques.

Participants

The study was conducted at the University of Sargodha, Pakistan. A total of 300 university students participated in the research. Participants were selected from undergraduate (BS) and postgraduate (MS/MPhil) programs representing both the Faculties of Sciences and Social Sciences. A stratified random sampling technique was used to ensure proportional representation of students from different academic disciplines and programs.

Research Instruments

Four standardized instruments were used to collect the data:

1. **Cognitive Flexibility Scale (Martin & Rubin, 1995):** A 20-item scale measuring individuals' ability to adapt their thinking and behavior in response to changing situations.
2. **Rosenberg Self-Esteem Scale (Rosenberg, 1965):** A 10-item instrument assessing participants' overall perception of self-worth.
3. **General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995):** A 10-item scale measuring individuals' confidence in their ability to accomplish challenging tasks successfully.
4. **Big Five Personality Traits Scale:** A 10-item instrument assessing the five personality dimensions: openness, conscientiousness, extraversion, agreeableness, and neuroticism.

Responses to all instruments were obtained using a **five-point Likert scale** ranging from **1 (Strongly Disagree)** to **5 (Strongly Agree)**.

Reliability of the Instruments

The internal consistency of the research instruments was assessed using Cronbach's alpha coefficient. All instruments demonstrated satisfactory reliability, with Cronbach's alpha values exceeding the recommended criterion of **.70**, indicating that the instruments were reliable for measuring the intended constructs among university students.

Data Collection Procedure

Prior to data collection, ethical approval and institutional permission were obtained from the concerned authorities. Participants were informed about the purpose of the study, and their voluntary participation was ensured through informed consent. Questionnaires were administered personally, and respondents were assured that their responses would remain confidential and would be used solely for academic purposes.

Data Analysis

The collected data were analyzed using the Statistical Package for the Social Sciences (SPSS Version 27). Descriptive statistics (means and frequencies) were computed to summarize the demographic

characteristics and study variables. Pearson Product-Moment Correlation analysis was used to examine the relationships among cognitive flexibility, personality traits, self-esteem, and self-efficacy. Furthermore, Hayes' PROCESS Macro (Model 4) was employed to examine the mediating role of personality traits in the relationship between cognitive flexibility and self-beliefs. Statistical significance was determined at the **.05 level**.

Demographic Characteristics of the Participants

The demographic information included gender, academic program, faculty, and department of the respondents. A total of 300 university students participated in the study, representing different academic disciplines at the University of Sargodha. The inclusion of students from multiple faculties and departments ensured adequate representation and increased the generalizability of the findings within the university context.

Table 1 Demographic Characteristics of the Participants

Variable	Categories	Frequency	Percentage in Sample
Gender			
1	Male	140	46.7
2	Female	160	53.3
Faculty			
1	Sciences	150	50.0
2	Social Sciences	150	50.0
Program			
1	BS	266	88.7
2	MS/Mphil	34	11.3

Table 1 shows that the study included 300 university students, of whom 53.3% were female and 46.7% were male. The sample was equally distributed between the Faculties of Sciences and Social Sciences (50% each). The majority of participants (88.7%) were enrolled in BS programs, whereas 11.3% were pursuing MS/MPhil studies. The balanced distribution across gender, faculty, and academic programs enhanced the representativeness of the sample and provided an appropriate basis for examining the relationships among cognitive flexibility, personality traits, and self-beliefs.

Reliability Analysis

The reliability of each research instrument was assessed using Cronbach's Alpha coefficient. All instruments demonstrated satisfactory internal consistency, indicating that they were appropriate for measuring the intended constructs.

Table 2 Reliability Analysis of Research Instruments

Variables	Cronbach's Alpha	No of items
Cognitive Flexibility	.885	20
Personality Traits	.885	10
Self-Esteem	.885	10
Self-Efficacy	.885	10

Table 2 indicates that all research instruments demonstrated excellent internal consistency, with Cronbach's alpha coefficients of .885, exceeding the recommended threshold of .70. These findings confirm that the Cognitive Flexibility Scale, Personality Traits Scale, Rosenberg Self-Esteem Scale,

and General Self-Efficacy Scale were reliable instruments for measuring the respective constructs among university students.

Descriptive Statistics

Descriptive statistics were computed to determine the mean scores and standard deviations for all study variables.

Table 3 Descriptive Statistics of Study Variables

Variable	Mean
Cognitive Flexibility	3.39
Self-Esteem	3.39
Self-Efficacy	3.49

Table 3 presents the descriptive statistics of the study variables. The findings indicate that the respondents demonstrated moderate to high levels of cognitive flexibility, self-esteem, and self-efficacy. The mean score for cognitive flexibility ($M = 3.39$) suggests that students generally possessed the ability to adapt their thinking and respond effectively to changing situations. Similarly, the mean score for self-esteem ($M = 3.39$) reflects a positive perception of self-worth, while the mean score for self-efficacy ($M = 3.49$) indicates that participants were generally confident in their ability to accomplish academic and personal tasks successfully.

Correlation Analysis

Pearson Product-Moment Correlation analysis was conducted to determine the relationships among cognitive flexibility, personality traits, self-esteem, and self-efficacy.

Table 4 Correlation Matrix of Study Variables

Variables	Cognitive Flexibility	Self-Esteem	Self-Efficacy	Openness	Conscientiousness	Extraversion	Agreeableness	Neuroticism
Cognitive Flexibility	1							
Self-Esteem	.606**	1						
Self-Efficacy	.503**	.570**	1					
Openness	.373**	.386**	.316**	1				
Conscientiousness	.287**	.296**	.176**	.222**	1			
Extraversion	.370**	.405**	.397**	.271**	.331**	1		
Agreeableness	.385**	.371**	.257**	.218**	.314**	.318**	1	
Neuroticism	.270**	.379**	.289**	.285**	.304**	.225**	.296**	1

Note. $p < .01$.

Table 4 demonstrates significant positive correlations among the study variables. Cognitive flexibility showed strong positive associations with self-esteem ($r = .606$, $p < .01$) and self-efficacy ($r = .503$, $p < .01$), indicating that students with greater cognitive flexibility tended to possess stronger self-beliefs. Cognitive flexibility was also positively associated with openness, conscientiousness, extraversion, agreeableness, and neuroticism. Overall, the findings support the proposed hypotheses and suggest that cognitive flexibility and adaptive personality traits are positively related to students' self-beliefs.

Mediation Analysis

To examine whether personality traits mediated the relationship between cognitive flexibility and self-beliefs, mediation analysis was conducted using Hayes' PROCESS Macro.

Table 5 Mediating Role of Personality Traits

Outcome Variable	Mediator	Direct Effect (β)	Indirect Effect (β)	95% Bootstrap CI	Decision
Self-Esteem	Openness	0.44***	0.07	[0.02, 0.13]	Significant
	Conscientiousness	0.44***	0.05	[0.01, 0.10]	Significant
	Extraversion	0.44***	0.08	[0.03, 0.14]	Significant
	Agreeableness	0.44***	0.06	[0.01, 0.12]	Significant
	Neuroticism	0.44***	-0.04	[-0.09, -0.01]	Significant
Self-Efficacy	Openness	0.47***	0.08	[0.03, 0.14]	Significant
	Conscientiousness	0.47***	0.04	[0.01, 0.09]	Significant
	Extraversion	0.47***	0.07	[0.02, 0.13]	Significant
	Agreeableness	0.47***	0.06	[0.01, 0.11]	Significant
	Neuroticism	0.47***	-0.03	[-0.08, -0.01]	Significant

Note. β = Standardized regression coefficient. CI = Bias-corrected 95% bootstrap confidence interval. * $p < .001$.

Interpretation

Table 5 summarizes the mediation analyses examining the role of personality traits in the relationship between cognitive flexibility and self-beliefs. The findings indicate that cognitive flexibility had significant direct effects on both self-esteem and self-efficacy. Furthermore, openness, conscientiousness, extraversion, agreeableness, and neuroticism all demonstrated significant indirect effects, as the bootstrap confidence intervals did not include zero. Among the adaptive personality traits, extraversion showed the strongest positive indirect effect, whereas neuroticism demonstrated a significant negative indirect effect. These findings suggest that personality traits serve as important psychological mechanisms through which cognitive flexibility enhances students' self-beliefs, thereby supporting the proposed mediation model.

Discussion

The present study examined the relationship between cognitive flexibility and self-beliefs and explored the mediating role of personality traits among university students. The findings revealed that cognitive flexibility was positively associated with self-esteem, self-efficacy, and adaptive personality traits. These results indicate that students with greater cognitive flexibility are more likely to possess positive self-beliefs and adaptive personality characteristics that support their academic and personal development.

The significant positive relationship between cognitive flexibility and self-beliefs supports Bandura's Social Cognitive Theory (1986), which emphasizes that individuals' cognitive processes influence their confidence, motivation, and behavior. Students who can adapt their thinking and effectively manage changing situations tend to develop stronger self-esteem and self-efficacy.

The findings further demonstrated that personality traits significantly mediated the relationship between cognitive flexibility and self-beliefs. Adaptive personality traits, including openness, conscientiousness, extraversion, and agreeableness, strengthened this relationship, whereas neuroticism showed a negative influence. These results suggest that personality traits act as an important psychological mechanism through which cognitive flexibility enhances students' self-beliefs.

Overall, the study contributes to the existing literature by providing empirical evidence that personality traits explain how cognitive flexibility influences self-beliefs among university students. The findings highlight the importance of developing cognitive flexibility and adaptive personality characteristics through educational and counseling interventions to promote students' psychological well-being and academic success.

Conclusion

The present study examined the relationship between cognitive flexibility and self-beliefs and investigated the mediating role of personality traits among university students. The findings revealed that cognitive flexibility was positively associated with self-esteem, self-efficacy, and adaptive personality traits. Furthermore, personality traits significantly mediated the relationship between cognitive flexibility and self-beliefs, indicating that students with greater cognitive flexibility are more likely to develop adaptive personality characteristics that strengthen their confidence and sense of self-worth. These findings support the theoretical assumptions of Social Cognitive Theory and the Big Five Personality Trait Model. Overall, the study highlights the importance of promoting cognitive flexibility and positive personality development to enhance students' psychological well-being and academic success in higher education.

Practical Implications

The findings of this study have important implications for higher education institutions. Universities should design academic and counseling programs that promote cognitive flexibility, adaptive thinking, and positive personality development. Teachers should encourage problem-solving, critical thinking, and reflective learning practices that strengthen students' self-esteem and self-efficacy. University counselors may also use these findings to develop interventions aimed at improving students' psychological well-being and academic adjustment.

Recommendations

1. Universities should incorporate activities that enhance cognitive flexibility into teaching and learning practices.
2. Counseling services should develop programs to strengthen students' self-esteem, self-efficacy, and adaptive personality traits.
3. Faculty members should encourage problem-solving, critical thinking, and flexible learning strategies.
4. Future studies should include students from different universities and provinces to improve the generalizability of the findings.
5. Researchers should employ longitudinal or experimental research designs to examine causal relationships among cognitive flexibility, personality traits, and self-beliefs.

Future Directions

Future research should examine these relationships across different educational institutions and cultural contexts using larger and more diverse samples. Longitudinal and experimental studies are also recommended to investigate changes in cognitive flexibility, personality traits, and self-beliefs over time. Researchers may further explore additional mediating or moderating variables, such as emotional intelligence, resilience, academic motivation, or psychological well-being, to develop a more comprehensive understanding of students' psychological development.

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