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Cognitive Flexibility and General Adaptation in University Students from Rural Background: Moderating Role of Self-Regulation

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ABSTRACT
The present study explored the relationship between cognitive flexibility, self-regulation and general adaptation in university students from rural areas. Purposive Sampling Technique was used. A sample of 200 students were collected from the university. Data was collected through using self-report measures of cognitive flexibility (Martin & Rubin, 1995), self-regulation (Przybyl & Chudak, 2022), and general adaptation (Arslan, 2022). Findings revealed positive relationship between cognitive flexibility, self-regulation and general adaptation. Results indicated that cognitive flexibility predicts adaptation primarily among individuals with low self-regulatory capacity. While high self-regulation appears to compensate for lower cognitive flexibility, suggesting the strong buffering effect of self-regulation skills.

***Keywords*:** Cognitive Flexibility, Self-Regulation, General Adaptation, Moderation Analysis, Rural Areas

Introduction
The ability to adapt successfully to changing environmental demands is essential for psychological well-being, academic success, and effective social functioning. University students, in particular, frequently encounter academic, social, and cultural transitions that require continuous adjustment. Consequently, adaptation has emerged as an important construct in psychological research (Baker & Siryk, 1984; Credé & Niehorster, 2012). An individual's capacity to perform well in social, academic, psychological, and everyday life areas is referred to as general adaptability. While poor adaptation is related with psychological discomfort and decreased functioning, successful adaptation has been connected to increased well-being, resilience, academic success, and life satisfaction (Friedlander et al., 2007; Martin et al., 2013). Therefore, encouraging favorable developmental and educational outcomes requires an understanding of the elements that promote adaptability.

Cognitive flexibility is a key component of adaptation. According to Diamond (2013) and Ionescu (2015), cognitive flexibility is the capacity to alter cognitive processes, change perspectives, and vary responses in response to shifting situational demands. It helps people to overcome inflexible thought habits and come up with different ideas in unfamiliar or difficult situations. Cognitive flexibility, a fundamental aspect of executive functioning, promotes adaptive behavior by enabling people to react appropriately to

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changes in their surroundings instead of depending on automatic reactions. According to research, people with cognitive flexibility are more equipped to assess many viewpoints, adjust inefficient tactics, and negotiate challenging social and academic contexts. According to meta-analytic research, psychological adjustment during stressful life transitions is positively impacted by flexibility in coping and cognitive response (Cheng et al., 2014).

Effective self-regulation is also necessary for successful adjustment, even though cognitive flexibility is a crucial cognitive resource. The processes via which people plan, monitor, assess, and alter their thoughts, emotions, and behaviors in order to achieve desired goals are referred to as self-regulation (Zimmerman, 2000). Zimmerman's social-cognitive model states that self-regulation entails cyclical processes of self-reflection, performance monitoring, and foresight that support goal-directed behavior in the face of obstacles and diversions (Zimmerman, 2000; Panadero & Alonso-Tapia, 2014). Positive educational, psychological, and behavioral outcomes, such as resilience, emotional control, and adaptation, have been repeatedly associated with self-regulation (Panadero, 2017; Zimmerman & Schunk, 2011). The combination of cognitive, behavioral, and environmental elements leads to adaptation, according to social cognitive theory, which also highlights the significance of self-regulatory mechanisms in converting cognitive resources into adaptive outcomes (Bandura, 1986).

While self-regulation and cognitive flexibility have been linked to successful adaptation on their own, little research has looked at how these factors interact. According to modern viewpoints, psychological resources work in combination rather than separately. While self-regulation may affect how well these tactics are applied, cognitive flexibility may allow people to come up with other approaches and viewpoints. According to recent research on self-regulatory flexibility, effective deployment of regulatory resources across shifting contexts is just as important for successful adaptation as having them (Friese et al., 2024).

From the standpoint of moderation, self-regulation may affect how strongly cognitive flexibility and adaptation are related. To deal with difficulties and environmental demands, people with worse self-regulation could rely more on cognitive flexibility. On the other hand, because their planning, monitoring, and behavioral control abilities offer several routes to effective adjustment, people with higher levels of self-regulation may be able to maintain adaptive functioning regardless of their degree of cognitive flexibility. In higher education settings, where students must handle a variety of academic, social, and personal issues, examining self-regulation as a moderator is especially pertinent.

Therefore, the present study aims to examine the relationship between cognitive flexibility and general adaptation while investigating the moderating role of self-regulation. Based on existing theoretical and empirical evidence, it is expected that cognitive flexibility will be positively associated with adaptation and that self-regulation will moderate this relationship, such that the strength of the association between cognitive flexibility and adaptation varies across different levels of self-regulation.

Method

Sample

Data was collected from undergraduate university students coming from rural areas with the mean age of 20.62 years (*SD*= 1.58). 57.5% of the sample consisted of female students while 42.5% were males.

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Measures

Cognitive Flexibility Scale (Martin & Rubin, 1995)

Cognitive Flexibility scale (Martin & Rubin, 1995) was used to measure the cognitive flexibility of university students. It is a 12 items measure with a six-point Likert scale ranging from (strongly disagree to strongly agree). The measure is found to be highly reliable with an alpha value of .81.

Self-Regulation Scale (Przybyl & Chudak, 2022)

The scale consists of 22 items rated on six-point Likert scale ranging from (strongly disagree to strongly agree). It has 4 sub factors namely Self-regulation Plan, Self-regulation Monitor, Self-regulation Adjust, Self-regulation Reflect. The Cronbach's Alpha reliability for Self-Regulation Scale is .89 which is highly reliable.

General Adaptation Scale (Arslan, 2022)

This scale comprises of 28 items with 4 sub-factors which are named as General Adaptation Psychological, General Adaptation Daily life, General Adaptation Academic, General Adaptation Sociocultural. These sub scales help in assessing adaptability in different domains of university student's life. The alpha coefficient value of the scale is .88 which is considered good.

Procedure

First of all, the permissions were taken from the authors of the scales and from the authority of the institutions to obtain data. Before data collection informed consent from the participants were obtained. The participants have been provided with the information about nature and purpose of the study through information sheet. The participants were given the right to withdraw at any time during the study and were informed that the information will be kept confidential and will be used only for the research purpose. Data was collected using questionnaire booklet comprising of study measures and that took approx. 15-20 minutes to be completed.

Results

The data was analyzed using the Statistical Package for Social Sciences (SPSS 25 version). Alpha values of the scales ranged from .70 to .80 (see Table 1) indicating that study measures were reliable. T-test indicated significant gender differences with females scoring higher on cognitive flexibility as compare to male students. Correlation analysis revealed significant positive correlation of cognitive flexibility with self-regulation and general adaptation.

Table 1

Descriptive statistics of the sample, alpha reliability estimates of study measures, and correlation among study variables (N= 200).

	Variables	*M*	*SD*	Range	α	1	2	3
1	Cognitive Flexibility	48.45	4.73	36-62	.70	-	.270**	.158*
2	Self-Regulation	91.64	10.44	41-122	.80	-	-	.116
3	General Adaptation	117.51	13.28	73-156	.72	-	-	-

Note. *M*= Mean; *SD*= Standard Deviation, *$p < .05$, **$p < .01$.

A moderation analysis was conducted to examine whether self-regulation moderated the relationship between CFtotal and global adaptation (see Table 2). The overall model was

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significant, $F(3, 196) = 5.14$, $p = .002$, explaining 7.3% of the variance in global adaptation ($R^2 = .073$). The interaction between CFtotal and self-regulation was significant, $B = -0.045$, $SE = 0.015$, $t = -2.99$, $p = .003$, indicating that the association between CFtotal and global adaptation varied across levels of self-regulation. Specifically, the positive relationship between CFtotal and adaptation weakened as self-regulation increased.

Table 2

Moderation analysis examining self-regulation as a moderator of the relationship between Cognitive Flexibility and General Adaptation among university students ($N = 200$)

Predictor	B	SE	t	p
Constant	-	-	-	-
Cognitive flexibility	0.424	0.201	2.11	.036
Self-regulation	0.179	0.095	1.89	.060
Cognitive flexibility × Self-regulation	-0.045	0.015	-2.99	.003**

Model Summary			
R^2	F	df	p
.073	5.14	(3, 196)	.002

Note. **p < .01.

Discussion

The current study looked at how self-regulation affects the link between global adaptation and cognitive flexibility in university students. The results showed that cognitive flexibility was positively correlated with global adaptation, indicating that people who are able to think differently, take into account different viewpoints, and modify their responses in response to situational demands are more likely to adapt successfully in social, academic, psychological, and everyday life domains. This result is in line with earlier studies that emphasize cognitive flexibility as a crucial psychological tool that fosters resilience, efficient problem-solving, and successful adaptation to shifting circumstances (Diamond, 2013; Ionescu, 2015).

More notably, the findings showed that the association between global adaptation and cognitive flexibility was strongly modified by self-regulation. People with lower levels of self-regulation showed a bigger positive correlation between cognitive flexibility and adaptability, while people with higher levels of self-regulation showed a weaker correlation. This result raises the possibility that self-regulation serves as a compensatory resource during the process of adaptation. Regardless of their degree of cognitive flexibility, people with good self-regulatory skills may be able to sustain adaptive functioning through efficient planning, monitoring, and behavioral control. On the other hand, people with poorer self-regulation abilities might rely more on cognitive flexibility to deal with obstacles and demands from their surroundings. These results are consistent with social cognitive theory, which highlights how behavioral and cognitive processes interact to promote successful adaptation (Bandura, 1986).

The results have significant practical ramifications for mental health practitioners and institutions of higher learning. Programs aimed at improving students' adaptability should emphasize the development of self-regulatory abilities like goal-setting, self-monitoring, and behavioral control in addition to the development of flexible thinking skills.

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Improving self-regulation may enable students to continue operating effectively even in the face of social, academic, or personal difficulties. When identifying students who could be at risk for adjustment issues, student counseling services may also benefit from evaluating both cognitive flexibility and self-regulation.

There are a few limitations of the study to be noted. Causal explanations of the observed connections are limited by the cross-sectional design. Furthermore, social desirability effects and common method bias might have been introduced by the use of self-report measures. Additionally, the study was limited to a particular student cohort, which would restrict the findings' applicability to other contexts and populations. Future studies could use experimental or longitudinal methods, use a wider range of samples, and investigate other factors like social support, coping mechanisms, emotional intelligence, and resilience. To further understand the mechanisms driving adaptation, future research may potentially look at more intricate models.

Overall, the results imply that while greater self-regulation seems to lessen reliance on cognitive flexibility, cognitive flexibility plays a particularly significant role in adaptation among people with poorer self-regulatory capacities. These findings emphasize how crucial it is to develop both cognitive flexibility and self-regulation in order to support university students' successful adaptation and general wellbeing.

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