

Mediation of academic self-concept between big five personality and academic performance

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Abstract: Personality and academic self-concepts are both likely to play significant roles in influencing academic achievement. Three hundred sixty undergraduate students completed the Five Factor Inventory, Academic Self-concept Inventory and reported their grade point average. Three of the Big Five traits, conscientiousness, openness and agreeableness, were positively related with all the four measures of academic self-concept, whereas neuroticism was negatively related with all the four measures. In addition, extraversion was positively related only with non-reiterative processing. The Big Five together explained 21% of the variance in grade point average (GPA), and academic self-concept explained an additional 5%, suggesting that both personality traits and academic self-concept contribute to academic performance. Further, the relationship between three of Big Five traits namely; conscientiousness, agreeableness, and openness with GPA were positively mediated and neuroticism with GPA was negatively mediated by each of the four academic self-concepts. The results explained many intricate relationships among Big Five traits, academic self-concepts and academic achievement.

Key words: Big Five traits, intrinsic motivation, self-efficacy, Non-reiterative processing, self-esteem, GPA

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I. INTRODUCTION

The Inventory of Learning Processes (ILP) is a unique measure of learning style that was developed in the context of cognitive psychology. It was derived from laboratory research concerned with information processing and memory. The original inventory (1) consisted of four factors namely synthesis-analysis, elaborative processing, fact retention and methodological study which are shown to have intricate relationships with academic performance mediating with personality traits. Subsequently, Geisler-Brenstein & Schmeck (1996) added a new factor to learning process called 'Academic Self-concept' in the revised ILP. The dimension of 'Academic Self-concept' refers to the extent to which a student has organized and emotionally invested his or her academic skills into his learning so that a smooth flow of processing can occur. This factor includes statements regarding self-efficacy, self-esteem, anxiety and locus of control. The four subscales on the Academic Self-concept resulting from both rational and factor analysis are labeled 'intrinsic motivation', 'self-efficacy', 'non-reiterative processing', and 'self-esteem'. All these concepts which indicate the extent to which a student has formed a good and healthy concept of self-as-a student, definitely point to some sources in the personality of the student. Hence, it is supposed that like other factors of ILP, academic self-concept should have mediating link between personality and academic performance. Therefore, the objective of the present research is to examine and explain this link between personality and academic self-concept.

1.1 The big five model

The Big Five framework of personality traits (3) has emerged as a robust model for understanding the relationship between personality and various academic behaviors (4). Conscientiousness is exemplified by being disciplined, organized, and achievement-oriented. Neuroticism points to degree of emotional stability, impulse control, and anxiety. Extraversion is displayed through a higher degree of sociability, assertiveness, and talkativeness. Openness is reflected in a strong intellectual curiosity and a preference for novelty and variety. Finally, agreeableness refers to being helpful, cooperative, and sympathetic towards others. There is some evidence that personality and motivation are intricately tied with individual differences in learning. Hence, Big Five trait model is appropriate to examine the link between personality and academic self-concept.

1.2 Personality and academic achievement

The ultimate goal of any academic behavior is academic achievement. Personality traits also influence academic achievement. For instance, conscientiousness has consistently emerged as a stable predictor of

academic performance (5) and GPA (6). Combinations of Big Five traits have also been found to predict various educational outcomes. Namely, conscientiousness and openness predict course performance (7), and agreeableness, conscientiousness, and openness predict overall academic performance (8, 4). Extraversion, openness, and conscientiousness have also been found to predict GPA, especially when students apply previously accumulated knowledge to real life settings (9). In contrast, neuroticism or emotional instability is negatively associated with academic achievement (5). In addition to the Big Five, other traits such as grit or perseverance (10) are also predictive of academic performance. Although these studies confirm the general significance of personality traits, there remains a need to examine other individual level factors such as students' academic self-concept.

1.3 Academic Self-Concept and Academic Achievement

Students differ in their processing of information, and acquiring knowledge (11, 12). Some students favor agentic styles, whereas others employ reflective styles, (1). A number of studies suggest that these individual differences in learning are predictive of student performance (13). Overall, the learning strategies most beneficial to performance include active thinking and organized studying (14). Some studies also suggest that academic self-concept is an output of the student's personality and his learning style. Many educational researches in the past have studied the influence of intrinsic motivation on academic achievement in various socially, culturally and ethnically diverse elementary, middle school and high school student populations (15, 16). All those studies have reported that intrinsic motivation is a significant contributor to one's academic performance. Similarly, perceived self-efficacy influences the adoption of pessimistic or optimistic thinking and, thus, one's approach to or avoidance of tasks (17). High self-efficacy helps in high academic achievement because students with high self-efficacy hold mastery beliefs. However, despite there being considerable evidence to support the direct effects of self-efficacy beliefs on academic achievement, studies that have shown that motivational mechanism mediates self-efficacy-achievement relationship. High self-efficacy belief creates strong intrinsic motivation among students. Likewise, several studies have also reported that deep elaborative and non-reiterative processing of information helps the students to outperform the students who use shallow reiterative processing. Similarly, a cross sectional study carried out to examine the relationship between self-esteem and student's academic performance reported a correlation of $r=0.32$ ($p<.01$). It has also reported that self-esteem is inversely correlated to perceived academic stress thereby improving students' academic performance (18). From the above review of literature, it is observed that the intricate relationship between personality traits, attributes of self-concept and academic achievement have not been systematically examined in understating the mediation of self-concept. Hence the current research was proposed.

1.4 The current Research

Prior research has established that both personality traits and each of the attributes in academic self-concept are associated with academic achievement. However not much is known about the joint influence of personality traits and academic self-concept on academic achievement. It is not also known how academic self-concept might mediate the relationship between personality traits and academic performance. Therefore, the current research sought to fill this gap in the literature by directly examining relationships between personality, academic self-concept, and academic achievement, and by examining the extent to which relationships between personality and academic achievement might be mediated by specific academic self-concept. Specifically, the following hypotheses were tested:

II. HYPOTHESES

1. Conscientious individuals are likely to be high achievers as they have a strong work ethic and are more likely to use deliberative, focused learning strategies. Hence, it is predicted that conscientiousness would be positively associated with all the four attributes of self-concept and hence, it would also be positively related to GPA.
2. Individuals who are high in openness display a strong intellectual curiosity and are eager to learn. Hence, it is predicted that openness would be positively associated with all the four attributes of academic self-concept as well as with GPA.
3. Due to broadly beneficial effects of cooperative attitude, it is predicted that agreeableness would positively associated with all the four attributes of academic self-concept and also with GPA.
4. Individuals with high neuroticism experience anxiety, self-doubt, and negative emotionality are likely to be disengaged from the learning process. Hence, it is predicted that neuroticism would be negatively related with all the four attributes of academic self-concept as well as with GPA.
5. As extraversion may be context specific, there cannot be predictions for how this trait would be related with academic self-concept or GPA.

6. As there are not enough prior studies reporting on the mediation of academic self-concept between Big Five traits and academic performance, no specific prediction is made and there would explorative analysis of the data.

III. METHOD

Participants were 360 undergraduate college students, including equal number of boys and girls who completed the Five Factor Inventory (NEO-FFI), the Inventory of academic self-concept, reported their current GPA, and provided demographic information. Students represented all undergraduate classes from 1st year to 3rd year in equal numbers from each class. They were from three different measures namely arts, science and commerce ranging between 17 and 20 years of age. The NEO-FFI consists of 60 items designed to assess the Big Five personality traits. It is the most widely used and robust measure of personality traits with sound psychometric properties established by previous researchers (3). In the present study, the Cronbach alpha values for each subscale's internal consistency were as follows: .81 (neuroticism), .77 (extraversion), .72 (openness), .78 (agreeableness), and .86 (conscientiousness).

The Inventory of Academic Self-concept (19) is a widely used 55-item measure that assesses four types of academic self-concept: intrinsic motivation (14 items), self-efficacy (17 items, non-reiterative processing (12 items), and self-esteem (12 items). A number of studies have found good initial evidence for internal consistency and construct validity, as well as for structural validity based on factor-analytic results (20, 21). In the present study, Cronbach alphas were .84 (intrinsic motivation), .78 (self-efficacy), .75 (non-reiterative processing), and .82 (self-esteem).

IV. RESULTS

4.1 Correlational analyses

A number of significant relationships were observed from correlational analyses (Table 1). (a) Neuroticism is negatively correlated with each of the four academic self-concepts as well as with GPA. (b) Openness, conscientiousness, and agreeableness, all were positively correlated with each of the academic self-concept measures as well as with GPA. Extraversion is positively correlated with only self-efficacy and self-esteem and not with GPA. Finally, all the four measures of academic self-concept were positively correlated with GPA.

4.2 Regression analyses

The extent to which Big Five personality traits predicted each of the four academic self-concepts was first examined (Table 2). It is observed that conscientiousness, agreeableness, openness and neuroticism explained 26% of the variances in intrinsic motivation, $F(5, 354) = 20.39, p < .01$; conscientiousness, openness, neuroticism and agreeableness explained 30% of the variances in self-efficacy, $F(5, 354) = 23.46, p < .01$; agreeableness, openness, neuroticism, and extraversion explained 24% of the variances in non-reiterative processing, $F(5, 354) = 18.66, p < .01$ and conscientiousness, openness, and neuroticism explained 29% of the variances in self-esteem, $F(5, 354) = 16.78, p < .01$.

Then, which specific Big Five personality traits and academic self-concepts explained significant variations in GPA were examined (Table 3). The Big Five traits explained 22% of the variances in GPA with conscientiousness, neuroticism, agreeableness, and openness emerging as significant predictors, $F(5, 354) = 9.44, P < .01$. On the other hand, academic self-concepts explained 24% of the variances in GPA with all the four measures of academic self-concept being significant predictors, $F(4, 356) = 12.68, p < .01$.

To investigate whether academic self-concepts explained significant variations in GPA, hierarchical regression analyses were conducted (Table 4). The four Big Five traits that previously emerged as significant were entered in the first step and in the second step all the four academic self-concepts were included because all of them emerged significant previously. Personality traits independently explained 21% of variances in GPA with all the four traits coming out as significant predictors. On the other hand, personality traits and academic self-concept together explained 26% of the variances of GPA, lending that an additional 5% of the variances were explained by the four academic self-concepts $F(8, 351) = 7.32, P < .01$. Hence, the results clearly implied the mediation of academic self-concepts between Big-Five traits and academic performance. Hence, mediation analysis was used.

4.3 Mediation analyses

To understand the intricate relationship between Big Five traits and academic self-concept as predictors of academic performance, the extent to which attributes of academic self-concepts mediated the relationship between Big Five traits and GPA were examined using multiple regression analyses. The results showed that when academic self-concepts such as intrinsic motivation, self-efficacy, non-reiterative processing, and self-esteem were included in regression analysis; the relationship between conscientiousness and GPA was reduced

from .28 to .22. The mediation analyses by Sobel’s test pointed out that intrinsic motivation (Sobel’s test- 2.82, $p < .01$), self-efficacy (Sobel’s test- 2.63, $p < .01$) and self-esteem (Sobel’s test- 2.21, ($p < .05$) partially mediated the relationship between conscientiousness and GPA while non-reiterative processing did not mediate (Sobel’s test- 1.03, $p > .05$). However, it is observed that all the four constructs of academic self-concept partially mediated the relationship between neuroticism and GPA by reducing the negative relationship from -.24 to -.17. The Sobel’s test statistics were 2.12 ($p < .05$) for intrinsic motivation, 2.46 ($p < .05$) for self-efficacy, 2.50 ($p < .05$) for self-esteem and 2.31 ($p < .05$) for non-reiterative processing. The relationship between agreeableness and GPA was also partially mediated by all the four academic self-concepts. This relationship was reduced from .26 to .20, when the measures of academic self-concept were included in regression analysis. The Sobel’s test statistics were 2.65 ($p < .01$) for intrinsic motivation, 2.21 ($p < .05$) for self-efficacy, 2.90 ($p < .01$) for self-esteem and 2.26 ($p < .05$) for non-reiterative processing. However, while the relationship of openness and GPA were mediated by three of the academic self-concept measures, the relationship of extraversion and GPA were not mediated by any measure of the academic self-concept. The relationship between openness and GPA was reduced from .29 to .19, when the academic self-concepts were included in regression analysis. Significant Sobel’s test statistics were reported for intrinsic motivation (3.19, $p < .01$), self-esteem (2.29, $p < .01$), and self-efficacy (2.76, $p < .01$) when mediation analyses were carried out between openness and GPA. The relationship of extraversion was reduced from .09 to .08, when the academic self-concept measures were included in the regression analyses

TABLE 1: Correlations Between Big Five Personality Traits, Academic Self-Concept and GPA

Academic self-concept subscales.					
Big Five personality traits	Intrinsic motivation	Self-efficacy	Non-reiterative processing	Self-esteem	GPA
Neuroticism	-0.21**	-0.38**	-0.27**	-0.33**	-0.18**
Extraversion	0.07	0.16**	0.11	0.32**	0.9
Openness	0.31**	0.34**	0.26**	0.27**	0.22**
Agreeableness	0.37**	0.25**	0.29**	0.21**	0.27**
Conscientiousness	0.41**	0.47**	0.18**	0.39**	0.37**
GPA	0.44**	0.38**	0.30**	0.37**	

TABLE 2: Multiple Regression Analyses With Big Five Traits Regressed On Each Of The Four Academic Self-Concepts.

Criterion	Predictor	Beta	R ²	Adjusted R ²
Intrinsic motivation	Conscientiousness	0.23		
	Agreeableness	0.29		
	Openness	0.32		
	Neuroticism	-0.18	0.26	0.251
Self-efficacy	Conscientiousness	0.31		
	Openness	0.24		
	Neuroticism	-0.32		
	Agreeableness	0.28	0.30	0.292
Non-reiterative processing	Agreeableness	0.22		
	Openness	0.24		
	Neuroticism	-0.27	0.24	0.22
	Extraversion	0.29		
	Conscientiousness	0.24	0.24	0.22
Self-esteem	Conscientiousness	0.25		
	Openness	0.27		
	Neuroticism	-0.30	0.29	0.280

TABLE 3: Two Separate Multiple Regression Analyses with Big Five Traits Regressed on GPA and the Four Academic Self-Concepts Regressed on GPA.

Criterion	Predictor	Beta	R ²	Adjusted R ²
GPA	Conscientiousness	0.28		
	Neuroticism	-0.24		
	Agreeableness	0.26		
	Openness	0.29		
	Extraversion	0.09	0.22	0.199
			0.27	

GPA	Intrinsic motivation				
		Self-efficacy	0.25		
		Self-esteem	0.22		
		Non-reiterative processing	0.24	0.24	0.231

TABLE 4: Hierarchical Multiple Regression Analyses with the Significant Big Five Personality Traits and Academic Self-Concept Subscales Regressed on GPA

Criterion		Predictor	Beta	R ²	Adjusted R ²
GPA	Step 1	Conscientiousness	0.22		
		Neuroticism	-0.17		
		Agreeableness	0.20		
		Openness	0.19		
		Extraversion	0.08		
				0.21	0.199
GPA	Step 2	Intrinsic motivation	0.30		
		Self-efficacy	0.25		
		Self-esteem	0.22		
		Non-reiterative processing	0.16	0.26	0.235

V. DISCUSSION

The results of the study established a number of interesting relationships between Big Five traits of personality, academic self-concepts, and academic achievement. Taken as a whole, these findings yielded a number of insights with potential practical implications on the dynamic interplay between personality, academic self-concept, as well as their joint influence on academic achievement.

First of all, the personality results have several implications for students and teachers. The results established that while conscientious, agreeableness and openness are critical for learning and performance, neuroticism is a great hindrance to it. On the other hand, extraversion is not a suitable condition for learning and performance. Secondly, each of the four academic self-concepts explained significant variances in GPA to point out that each one of them is important for learning and performance. Intrinsic motivation is most needed self-concept for learning. Growing in self-efficacy and having the right self-esteem are also essential constructs of the self for helping students as better learners and performers. An interesting contribution of result is that non-reiterative processing is found to be strongly correlated with GPA and contributing about 16% of the variances. It gives an important message to the students and teachers that over emphasis on memorizing, repetition, and cramming is not a good format of learning and performance. Rather, non-reiterative processing are more useful learning processes. For example, a teacher who explains a concept or theory by giving personal life examples, refers to relevant current events, illustrates the material using hierarchical concepts, or organizes information around meaningful themes may help students process information more successfully.

Thirdly, regarding the relationship between personality traits and academic self-concepts, neuroticism significantly predicted each of the four aspects of academic self-concept negatively. This suggests that students who are given to worry and anxiety are likely to have low academic self-concepts leading them to disengage from the learning process. On the other hand, openness and conscientiousness significantly and positively predicted each of the four self-concepts to suggest that students who are organized, disciplined, determined and intellectually curious are more likely to enhance their academic self-concept leading to better learning and performance. Extraversion, only significantly predicted non-reiterative processing to suggest that extraversion is not an enough condition for good academic self-concept and thereby good learning and performance.

Finally, the mediation analysis pointed to number intricate relationships between personality traits and academic performance as mediated by different academic self-concepts. A 5% increase in the variances of GPA when academic self-concept was introduced in the hierarchical regression analyses suggested the mediation effect (Sobel's test significant) of academic self-concept. The result implies for students and teachers that by appropriately improving the academic self-concepts of students, the impact of personality variables can be taken care of for improved learning and performance.

To conclude, the results made an important contribution to our understanding of academic achievement by identifying a number of linkages between personality, academic self-concepts, and academic achievement, and also by helping to understand how academic self-concept mediate the relationship between personality traits and academic achievement. Future research could further our comprehension of the complex nature of academic achievement by examining other individual difference factors as well as environmental factors such as socioeconomic status or type of college as predictors of academic achievement.

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