COSTA & MCCRAE PERSONALITY TRAITS AS DRIVERS OF ACADEMIC ACHIEVEMENT AMONG ASPIRING PROFESSIONALS

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ABSTRACT

Objectives: Present study is aimed to examine the effect of personality traits on academic achievement of aspiring professionals studying in various educational institutions of Haryana and Delhi.

Method: This study is based on exploratory cum descriptive research design. In order to assess the personality traits, NEO-FFI personality inventory (Costa & McCrae) has been administered to 2000 aspiring professionals. Respondents were asked to report the percentage of marks on a scale constituting two levels of academic achievement i.e. above 65 per cent marks (high level) and below 65 per cent marks (low level). The collected data has been analyzed by applying Stepwise Linear Discriminant Analysis (SLDA).

Results: Conscientiousness, openness to experience and neuroticism came out as the significant discriminators separating the low and high achieving aspiring professionals. However, extraversion came out as the least significant discriminator of the two groups of the dependent variable. On the contrary, agreeableness being an insignificant predictor has been excluded from the analysis.

Conclusion: From the results of this study, the personality psychologists can get clues about the significant competency characteristics affecting the level of academic achievement of aspiring professionals which would help them in guiding the students to those courses/disciplines, where the chances of their success are the highest.

Keywords: Personality Traits, Academic Achievement, Aspiring Professionals, Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness.

1.1 Introduction

Education, being a very first and necessary human activity, plays an important role in complete development of the human capital and by imparting necessary knowledge and skills; it improves the individual productivity leading to overall economic growth of a country (Saxton, 2000). India has now become a major player in worldwide knowledge economy and has also seen a constant high rate of growth in past few years and it is proved that the skill-based tactics have a big hand behind this exceptional rate of economic growth. These activities are certainly supposed to be driven by the educated youth of India. In this regard, Indian government has also taken some crucial steps to make this system even better. But, despite of all these efforts, Indian graduates and postgraduates are still facing the problem of "lack of personality development".

In light of this, various researchers have identified and named a list of personality traits accountable for a student's academic and carrier success and discovered the big-five model of personality as the most research supported and best quality model of an individual's personality. This big five model constitutes the traits namely neuroticism, extraversion, openness to experience, agreeableness and conscientiousness.

Academic achievement of a student is leaded by his/her personality type i.e. theoretically, it has been proved that a high score on conscientiousness, agreeableness and openness to experience may lead to high level of academic achievement i.e. achievement related behaviors may get enhanced as a result of high level of these aforementioned traits. On the contrary, a high level of neuroticism and extraversion may lead to a diminished level of academic performance. Thus, along with lowering the negative tendencies of being anxious, shy, irrational and obsessed, it is imperative to enhance the level of achievement orientation, candidness, ingeniousness, openness, meticulousness and attentiveness in the students.

In the light of these above stated facts, present research is being conducted with an objective to study the underlying relationship between big five personality traits (neuroticism, extraversion, openness to experience, agreeableness and conscientiousness) and the level of academic achievement of aspiring professionals studying in the states of Haryana and Delhi.

Furthermore, academic achievement of a student may be defined as the degree to which a student/learner is being benefitted from the given instructions related to a specific area of education (Crow and Crow, 1969). Usually, it is measured with the help of school/college examination scores attained by a student. For the present research, it has been categorized in to two broad categories namely high level (above 65 per cent marks) and low level (below 65 per cent marks). Data analysis is devoted to study the underlying relationship between personality traits and academic achievement by applying Stepwise Linear Discriminant Analysis (SLDA).

1.2   Review of Related Literature

Personality has been under research since 1973' (McClelland, 1973). The interest in relationship between personality and academic achievement has continued throughout the 20th and 21st century and has been examined by many researchers. Thurstone and Thurstone (1930) accumulated the work done by the past researchers related to the field of personality and explained the "neurotic inventory" given by Woodworth (1917) in detail. In order to distinguish between neurotic and non neurotic individuals, a survey has been conducted by taking 694 university freshmen as the sample unit. Findings revealed an overlap among neuroticism and the other related terms namely social maladjustment, nervousness and emotional instability etc. Cattell (1933) determined the underlying difference between the terms introversion and extraversion and also examined some temperamental factors that can provide a base to that distinction. Correlation analysis resulted in three diverse clusters namely character factor 'w', temperament factor 'c' or cleverness and group factor 'a' or adjustment factor. Likewise, Guilford and Guilford (1934)

focused on identifying separating the five personality traits from a set of trait variables constituting 36 items. The first factor shows similarity with the trait namely introversion-extraversion, the second factor has been found similar to the juvenile behavior, the third factor relates to ascendancy, the fourth one refers to a carefree or open attitude and the last one shows similarity with the logical leadership.

Furthermore, Eysenck (1947) while identifying the facets related with the term personality, identified neuroticism as the most important factor constituted by the items that basically describe the "poorly structured personality". AS far as the role of personality in determining the academic achievement is concerned Gough (1953) highlighted the importance of the big five personality factors by giving special attention on the role of the facets of conscientiousness among high scorers. In addition with the role of conscientiousness, academic achievement has also found to be affected by some other qualities of students like cleverness, imagination and clear thinking etc. Likewise, Smith (1967) implemented the early version of the big five model (Norman, 1963) constituting the factors namely strength of character, agreeableness, extraversion, emotional stability and elegance in educational research. Strength of character has been found as the most important trait associated with students' level of academic achievement. Furthermore, Zuckerman,

Kuhlman and Camac (1988) questioned the existence of only two available or identified personality domains of that time namely extraversion and neuroticism. Researchers raised a question against the existence of only two domains of personality and directed the other researchers working (in that field) towards the identification of more facets of personality construct and their relationship with the scholastic achievement. Raad and Schouwenburg (1996) reviewed the available literature based on the combined area of personality, learning and education in detail. The issues related to relationship between the personality traits and intelligence, motivation and achievement-orientation have also been described in detail. Literature suggested the major role of two personality domains namely conscientiousness and neuroticism (level of emotional stability) in predicting the academic achievement. Furthermore, till that decade (when the study was conducted by the researchers) personality field was not able to provide a clear cut depiction about the area that can become the fundamental base of the development of training programs.

Ashton and Lee (2001) proposed a two part theoretical basis for the six personality dimensions. The six broad dimensions of personality traits i.e. surgency, agreeableness, conscientiousness, emotional stability, openness/intellect/imagination and honesty (new) have been bifurcated to two parts. Honesty, agreeableness and emotional stability have been explained with the help of fairness, forgiveness and empathy. While, the other three dimensions namely surgency, conscientiousness and intellect have been explained with the help of social, task-related and idea related actions. Furthermore, Ashton and Lee (2001) also addressed the doubts raised by saucier on their projected six factor model of personality. The doubt of saucier was based on the ignorance

of the "Negative Valance" factor from the personality structure. Authors then explained the reason of ignorance by explaining the confusion related with the term negative valance. They said that though this term has emerged out as an important term in various lexical studies related to personality structures but the inclusion of this term in personality structure in general would create a lot of confusion. In addition, they also highlighted the importance of honesty factor included in the six factor structure of personality.

Furnham and Chamorro-Premuzic (2004) examined the role of personality and intelligence in predicting the statistics examination grades of undergraduate students of university college London. Personality traits showed an incremental validity in prediction of statistics examination grades and it is confirmed that students who are introverts, conscientious and very less open by nature, generally attain best results in their exams. Likewise, Chowdhury (2006) examined the impact of personality traits on academic achievement of undergraduate students. Results revealed the fact that all the personality traits (except extraversion) have positively and significantly predicted the academic performance of students.

Furthermore, as compared to conscientiousness, and agreeableness, both openness and neuroticism came out as stronger predictors of academic achievement of students. Moreover, Wgaerman and Funder (2006) also analyzed the role of personality traits in predicting college students' academic achievement ahead of the traditional predictors (High school GPA and SAT scores) of academic performance. Conscientiousness being a unique predictor counted for an incremental validity over the traditional predictors. The overall personality of students has turned out to be a significant predictor of students' academic performance. In relation to the aforementioned fact, O'Connor and Paunonen (2007) scrutinized the available literature depicting the relationship between big-Five personality traits and academic-achievement in post secondary education. In the light of reviewed empirical studies consciousness emerged out as the strongest predictor of the academic performance. While, a negative association has been identified between extraversion and academic achievement whereas, a week association is found to exist between openness to experience and academic performance of students. Additionally, Noftle and Robins (2007) empirically proved that personality traits can predict the academic performance even when the effect of intelligence and cognitive ability are controlled. Neuroticism, extraversion, agreeableness, consciousness, extraversion and openness to experience are the five traits constituted the overall personality of an individual. Some researchers focused on the relationship of these five broad dimensions with the academic achievement while, others analyzed the impact of narrow facets of personality traits on the academic achievement. In comparison to the big-five personality traits, narrow facets came out as better predictors of academic performance of students (O'Connor and Paunonen, 2007).

Chamorro-Premuzic and Furnham (2008) framed a model illustrating the relationship of personality traits and intelligence with the academic performance. Researchers explored that as compared to intelligence, personality traits came out as better predictors of academic performance. Out of the five personality traits, consciousness came out as the strongest predictor of examination grades of students. Kammarju, Karau and Schmeck (2009) analyzed the role of big five personality traits in predicting college students' academic motivation and achievement. Big-Five emerged as significant predictors of students' Grade Point Average (GPA) i.e. less neurotic, open, conscious and agreeable students tend to attain high GPA scores. In contrast, Cárdenas and Stout (2010) examined the role of personal characteristics (namely personality, emotional intelligence and subjective well-being) in mediating the relationship between intellectual abilities and the decision making practices. Findings depicted no significant correlation (due to methodological incorrectness) of the personal characteristics with the intellectual abilities and the decision making practices of respondents.

Smritnik-vitulic and Zupancic (2011) examined the role of personality traits and different groups of informants (Self, mother and peers) in predicting the academic achievement of adolescents. Consciousness came out as the strongest single predictor of the adolescents' GPA. It is suggested that high level of conscientiousness can compensate for lack of cognitive ability among adolescents. The above fact was further supported by Brazdau and Mihai (2011) by analyzing the practical usage of conscientious quotient in the field of psychology along with intelligence. Results indicated a strong correlation between intelligence and academic performance and conscientiousness came out to be a less significant predictor of academic performance than intelligence. Likewise, Leeson, Ciarrochi and Heaven (2012) also examined the role of personality and intelligence in predicting the academic performance of adolescents. In opposition to the above results, intelligence showed an incremental validity over personality traits in predicting the academic performance of adolescents.

In conclusion, it can be said that the literature revealed mixed results about the relationship of personality traits and academic performance. Some researchers found personality traits to be the strongest predictor of academic performance beyond the other traditional measures like intelligence, high school GPA and SAT scores while, others declared intelligence as better predictor of academic performance than personality traits. Out of the five personality traits consciousness associated with personality traits in a positive manner while, neuroticism and extraversion found to be negatively correlated with the academic performance. As compared to the big-five personality traits, narrow traits (Facets) came out as more significant predictors of students' academic performance.

1.3 Objective and Hypotheses

After reviewing the available literature related to big five personality traits and academic achievement, it is seen that personality has a significant effect on students' level of academic achievement. With the above considerations, the objective for the present study is outlined as:

1.   To evaluate the underlying relationship between

personality traits and the academic achievement of aspiring professionals........

To achieve the aforesaid objectives, following alternate hypotheses have been formulated.

H_a: There is a significant relationship between personality traits and academic achievement of aspiring professionals.

H_{a101}: There is a negative relationship between neuroticism and academic achievement of aspiring professionals.

H_{a102}: There is a negative relationship between extraversion and academic achievement of aspiring professionals.

H_{a103}: There is a positive relationship between openness to experience and academic achievement of aspiring professionals.

H_{a104}: There is a positive relationship between agreeableness and academic achievement of aspiring professionals.

H_{a105}: There is a positive relationship between conscientiousness and academic achievement of aspiring professionals.

1.4   Research Methodology

Present study is based on exploratory cum descriptive research design. In order to determine the relationship between personality traits and academic achievement, data has been collected from 2000 aspiring professionals (by adopting a non-probability/convenient sampling technique) pursuing professional courses (MBA, MCA, BBA, B. Tech, M. Tech, B-Pharmacy and M-Pharmacy etc.) from various public and private educational institutions of Haryana and Delhi with the help of a standardized scale named NEO-FFI developed by Costa & McCrae. This scale contains 60 statements constituting five robust factors namely neuroticism (insecure and shy), extraversion (sociable, open to experience, and friendly), openness to experience (curiosity, tendency of exploration and imagination), agreeableness (kind, caring and cooperative) and conscientiousness (hard working, achievement oriented and organized).

Furthermore, out of the total 60 statements, 12 statements are devoted to each of the above stated five factors. Some of the items are "I like to have a lot of people around me", "I am not a worrier", "Once I find the right way to do something, I stick to it" etc. this scale is open to use for research purpose. Furthermore, the actual reliability score or the overall alpha coefficient came out to be 0.879 which is internally reliable.

Academic achievement of these aspiring professionals is measured by the percentages of marks obtained by them in their previous semester on a scale constituting two levels of academic achievement i.e. above 65 per cent of marks and below 65 per cent of marks. The students falling under the level above 65 per cent marks are considered to encompass high level of academic achievement and the students falling under the level below 65 per cent marks are considered to encompass low level of academic achievement. The collected data has been analyzed by applying Stepwise Linear Discriminant analysis (SLDA). SLDA signifies the underlying relationship between personality traits and academic achievement.

1.5   Data analysis and Interpretation

The analysis devoted to determine the underlying relationship between the two variables of the present research (personality traits and academic achievement) is as follows:

Relationship between Personality Traits and Academic Achievement using Stepwise Linear Discriminant Analysis (SLDA)

The fear of the examination can become a reason for nervousness and anxiety that can adversely affect the marks obtained (academic achievement) in any test or exam. Sometimes, the lack of application of the possessed ability on the right place at right time may also become a reason of failure on the task (Khalid, 2003). Hence, it is necessary to determine the traits that should be enhanced in order to improve the application of an individual's ability. In classroom, students from various cultural and regional backgrounds interact with each other and behave in an exclusive manner. Hence, it has become essential to determine the personality domains that lead to academic success.

This section basically determines the personality factors that can help in discriminating the higher and lower level of academic achievement of aspiring professionals. In this regard, present chapter enhances our understanding about the underlying relationship between personality traits (neuroticism, extraversion, openness to experience, agreeableness and conscientiousness) and academic achievement (measured by two levels i.e. high level (above 65 per cent marks) and low level (below 65 per cent marks) by applying Stepwise Linear Discriminant Analysis (SLDA) on the collected data with the help of SPSS. With this background, based on the literature review, a model is proposed ahead.

Model Specifications

In psychology, the big five personality traits (five broad domains of personality) are used to explain human personality. As suggested by the literature, big five model of personality traits have been used in order to determine the relationship between personality traits and academic achievement of aspiring professionals. This model consists of five broad domains of personality namely: neuroticism, extraversion, openness to experience, agreeableness and conscientiousness. Academic achievement has been categorized in to two levels namely: high level (above 65 per cent marks) and low level (below 65 per cent marks). Literature suggests a strong association between these five domains of personality traits and the level of academic achievement as is depicted with the help of following discriminant analysis linear equation.

Academic Achievement (Discriminant Score) = v_1 (Neuroticism) + v_2 (Extraversion) + v_3 (Openness to Experience) + v_4 (Agreeableness) + v_5 (Conscientiousness) + Constant.

Validating the Model Using Stepwise Linear Discriminant

Analysis

Relationships of each of the variables are tested by Stepwise Linear Discriminant Analysis, where each causing variable is taken as independent variable and the resultant variable is taken as dependent variable. The following table is analyzing the relationship between personality traits and academic achievement of aspiring professionals.

It can be seen from Table 1.1 that out of the total 2000 cases, 1429 cases have been chosen for analysis. Furthermore, out of these 1429 cases, 1169 (approx 80 per cent) cases are selected and constituted the validation sample, while 260 (approx 20 per cent) remained unselected and constituted the holdout sample. Furthermore, findings (Table 1.1) suggested that the mean values for neuroticism (31.78), extraversion (35.82), openness to experience (31.31), agreeableness (30.77) and conscientiousness (32.21) for the two levels of academic achievement (below 65 per cent marks and above 65 per cent marks), seem apparently different and suggests that conscientious, open and agreeable students tend to attain high level of academic achievement. However, an enhancement in neurotic and extravert behaviors tends to lower the level of academic achievement of these aspiring professionals.

Furthermore, the two levels of academic achievement have been widely separated in case of conscientiousness (28.70 for the group below 65 per cent marks and 35.65 for the group above 65 per cent marks), openness to experience (28.10 for the group below 65 per cent marks and 34.45 for the group above 65 per cent marks) and agreeableness (27.92 for the group below 65 per cent marks and 33.58 for the group above 65 per cent marks).

However, in case of neuroticism (34.06 for the group below 65 per cent marks and 29.55 for the group above 65 per cent marks) and extraversion (36.76 for the group below 65 per cent marks and 34.90 for the group above 65 per cent marks) the difference is found quite smaller (Table 1.1). In order to check the significant difference between the mean extents of these five domains of personality traits among the low and high level of academic achievement, Wilks's Lambda statistics has been calculated. The values of Wilks's Lambda for neuroticism (0.926), extraversion (0.985), openness to experience (0.872), agreeableness (0.905), and conscientiousness (0.866) possessed by the aspiring professionals seem to be apparently different. Literature suggests that "smaller the Wilks's Lambda, more important will be the independent variable to the discriminant function" i.e. the value of Wilks's Lambda states the importance of independent variables (with low and high value) to the resultant discriminant function (dependent variable). Likewise here, it can be seen that according to the value of Wilks's Lambda statistics, conscientiousness (0.866) and openness to experience (0.872) came out as the most important variables in differentiating between the high and low achieving aspiring professionals. Table 1.2 depicts the correlations among the big five personality traits. As the correlation values for all the domains (neuroticism, extraversion, openness to experience, agreeableness and conscientiousness) lie between the range of -0.75 to 0.75 hence, multi-collinearity (Interdependence of big-five traits) is not likely to be a problem here.

Table 1.1 Wilks's Lambda Depicting the Relationship between Personality Traits and Academic Achievement

Number of Cases/ Aspiring Professionals			Group Statistics					
Valid Cases (80 per cent approx)	Unselected Cases (20 per cent approx)	Total	Personality Traits	Mean of Marks in Percentage			W	Sig.
				Below 65 Per Cent Marks	Above 65 Per Cent Marks	Total		
1169	260	1429	N	34.0604	29.5508	31.7844	0.926	0.00
			E	36.7651	34.9051	35.8263	0.985	0.00
			O	28.1054	34.4559	31.3105	0.872	0.00
			A	27.9206	33.5814	30.7776	0.905	0.00
			C	28.7098	35.6525	32.2139	0.866	0.00

Source: Primary Data (SPSS Output),

Note: N-Neuroticism; E-Extraversion; O-Openness to Experience; A-Agreeableness; C-Conscientiousness; W-Wilks's Lambda

Talking about the stepwise linear discriminant analysis (Table 1.3), it basically starts with a model that does not include any predictors (forecasting variable) i.e. (step 0). In addition, Wilks's Lambda method chosen for the present study is a variable selection method for stepwise discriminant analysis that selects the variables according to their order of importance.

Likewise, analysis reveals that conscientiousness (being the most important variable) possessing the highest value of F to Enter (180.197) is entered first followed by openness to

experience having the second highest value (104.320), followed by neuroticism (73.058) and extraversion (56.422) possessing the 3rd and 4th highest value of F to Enter (Table 1.3). Hence, conscientiousness came out as the most important personality trait that differentiates between the two groups of high and low achieving aspiring professionals.

Table 1.2 Matrix Representing Correlation among the Big Five Personality Traits

Personality Traits		N	E	O	A	C
Correlation	N	1.000	0.466	-0.376	-0.397	-0.476
	E	0.466	1.000	-0.303	-0.396	-0.378
	O	-0.376	-0.303	1.000	0.652	0.681
	A	-0.397	-0.396	0.652	1.000	0.674
	C	-0.476	-0.378	0.681	0.674	1.000

Source: Primary Data (SPSS Output)
Note: N-Neuroticism; E-Extraversion; O-Openness to Experience; A-Agreeableness; C-Conscientiousness

The tolerance values shown in Table 1.3 indicate the presence/absence of multi-collinearity among the independent variables in the equation. Multi-collinearity (interdependence of these five traits) is indicated, when the tolerance value for an independent variable is less than 0.10. Findings depict that the tolerance value for conscientiousness (0.471), openness to experience (0.532), neuroticism (0.675), and extraversion (0.750) came out to be higher than the minimum acceptable limit of 0.10. Hence, multi-collinearity is not a problem in this stepwise linear discriminant analysis i.e. these four domains are included in the analysis (agreeableness is excluded from the analysis) and are contributing well towards the model under concern. The resultant signs associated with (standardized discriminant coefficients) each of these coefficients indicate the direction of association of the predictor (independent) variables with the dependent variable (academic achievement) under concern. Analysis reveal that out of the five domains of personality, only four domains (i.e. conscientiousness (0.493), openness to experience (0.472), neuroticism (-0.321), and extraversion (0.199)) came out as the most important traits that impact the level of academic achievement of the aspiring professionals.

Hence, the analysis revealed no significant pattern of relationship between agreeableness and academic achievement of aspiring professionals. Structure matrix (Table 1.3) depicts the order of importance of the four personality domains i.e. conscientiousness (0.892), openness to experience (0.868), neuroticism (-0.641) and extraversion (least important, -0.280).

Table 1.3 Canonical Discriminant Coefficients Included in Stepwise Linear Discriminant Analysis

Personality Traits	T	F	W	SC	UC	SM	Functions at Group Centroids		Prior Probabilities for Groups	
							Below 65 Per Cent Marks	Above 65 Per Cent Marks	Above 65 Per Cent Marks	Above 65 Per Cent Marks
C	0.471	180.197	0.866	0.493	0.056	0.892				
O	0.532	104.320	0.848	0.472	0.057	0.868				
N	0.675	73.058	0.842	-0.321	-0.040	-0.641				
E	0.750	56.422	0.838	0.199	0.026	-0.280	-0.444	0.436	0.495	0.505
*A	-	-	-	-	-	0.689				
					(Constant= -3.240)					
Cut Off Point=(-0.444=36)/2=-0.004										

Source: Primary Data (SPSS Output)
Note: a-Agreeableness is not included in the analysis; N-Neuroticism; E-Extraversion; O-Openness to Experience; A-Agreeableness; C-Conscientiousness; SC-Standardized Canonical Discriminant Function Coefficients; UC-Unstanderdized Canonical Discriminant Function Coefficients; F-F to Enter; T-Tolerance; W-Wilks's Lambda; SM-Structure Matrix

Furthermore, the values obtained for unstanderdized canonical discriminant function coefficients are used to create the discriminant function (equation) representing the underlying relationship between big five personality traits and academic achievement, which can be diagrammatically explained in Figure 1.2.
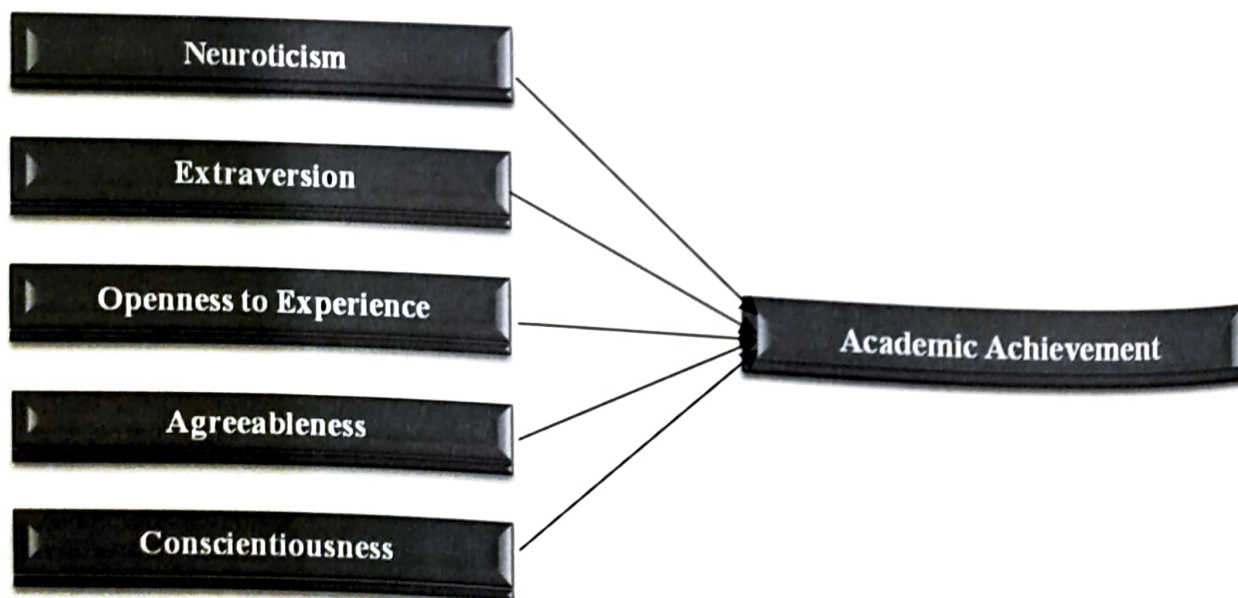
Academic Achievement (Discriminant Score) = (0.056) Conscientiousness + (0.057) Openness to Experience + (-0.040) Neuroticism + (0.026) Extraversion + (-3.240).

Findings (Table 1.3) thus depict the values for the unstanderdized canonical discriminant function coefficients. In case of neuroticism, negative values of both unstanderdized canonical discriminant function coefficient (-0.040) and standardized discriminant coefficient (-0.321), clearly indicate a significant negative contribution of this trait towards the resultant discriminant function.

Table 1.3 also depicts the underlying relationship between extraversion and academic achievement. Positive values for both unstanderdized canonical discrimimnant function coefficient (0.026) and standerdized canonical discrimimnant function coefficient (0.199) thus indicate a positive but an insignificant contribution of this trait towards the resultant discriminant function i.e. an increasing level of extraversion (being more social and friendly) has a little bit positive but an inconsequential impact on the gained level of academic achievement of aspiring professionals. Furthermore, in case of openness to experience, analysis has revealed a highly significant and positive relationship between openness to

experience and academic achievement (unstanderdized canonical discrimimnant function coefficient (0.057) and standardized discriminant coefficients (0.472)). The fourth personality domain i.e. agreeableness, due to its insignificant discrimination ability, has been excluded from the analysis. Moreover, analysis has revealed a highly positive and significant contribution of conscientiousness towards the resultant discriminant function i.e. an increasing level of this trait (being more hardworking, organized and meticulous towards the academic and personal goals) has a considerable and noteworthy impact on the gained level of academic achievement of aspiring professionals.

Table 1.3 also depicts the value of group centroids (mean value of Discriminant scores (D) for a particular group). The centroid value for Group 1 (above 65 per cent marks) is positive (0.436), while for the Group 2 (below 65 per cent marks), it is negative (-0.444). Range given in Table 1.3 shall be used to generate the category of the dependent variable. Value of dependent variable less than -0.444 would be considered as low academic achievement; while greater than 0.436 would be considered as high academic achievement. For evaluating the values between the range of -0.444 to 0.436, discriminant score can be calculated for every respondent. The cut off value (0.436-0.444 /2=-0.004) for the two groups is computed to be -0.004. Hence, value of dependent variable between -0.444 to -0.004 may be considered as low academic achievement and between the range of -0.004 to 0.436 may be considered as high academic achievement.

Source: Literature Review

Figure 1.1: Basic Model Depicting the Underlying Relationship between Big-Five Personality Traits and Academic Achievement

Model Fit Indices

Findings (Table 1.4) represent the summary of canonical discriminant functions (i.e. the Eigen value and Wilks's Lambda value). Here, the resultant Eigen value (0.194) and the canonical correlation (R=0.403) provides the index of the overall model fit. In this case, a canonical correlation of 0.403 suggests that the underlying model explains R^2=16.24 per cent of the variation in the grouping variable (academic achievement).

Wilks's Lambda is a determinant of the power of a resultant equation/function in separating the two groups of the dependent variable i.e. Wilks's Lambda (0.838) measures that how well the resultant discriminant function separates the two groups (above 65 per cent marks and below 65 per cent marks) of academic achievement of aspiring professionals.

Significant values of both Wilks's Lambda (0.838; p<0.00) and chi-square (206.457; p<0.00), represent a highly significant function and presents the fraction of total variability not explained by the independent variables (neuroticism, extraversion, openness to experience, agreeableness and conscientiousness). The resultant function/equation alone is able to explain only (1.00-0.838=0.1624) 16.24 per cent of the total variance in the dependent variable (academic achievement). In Table 1.5 the total of the diagonal elements represent the correctly classified cases and the off diagonal elements represent the misclassified or error cases. In the analysis sample out of the total 1169 cases, (266+488) 754 cases are correctly classified and in the unselected sample (hold out sample) 184 cases out of the total 260 cases are accurately classified. Classification results signify that (hit ratio) 64.5 per cent of selected original grouped cases are correctly classified in to above 65 per cent marks (high academic achievement) and below 65 per cent marks (low academic achievement) and 70.8 per cent of unselected original grouped cases are correctly classified in to the two aforementioned categories of academic achievement. Table 1.5 also depicts the results of the cross-validated analysis. It signifies that the model is able to predict 64.2 per cent of the cross-validated grouped cases in an accurate manner. The cross-validated accuracy rate is also compared with the "by chance accuracy rate". Operationally speaking, the cross-validated classification precision rate should be (approx 25 per cent) higher than the comparative "by chance precision rate". Likewise, here the proportional by chance accuracy rate can be computed by squaring and summing the proportion of cases in each group from the table of prior probabilities for groups depicted in Table 1.3 i.e. ($0.495^2 + 0.505^2 = 0.500025$) and the cross-validated accuracy rate computed by SPSS was 64.2 per cent, which is greater than the proportional by chance accuracy criteria of 62.5 per cent (1.25x50.0 per cent=62.5 per cent). Hence, the criteria required for classification accuracy is satisfied. The model seems to be perfectly fit in to the collected data. As the results depicted in Table 1.5 seem to be unbiased and fair in every respect so, the accuracy level of 64.5 per cent can be considered as good and acceptable.

Table 1.4 Eigen Value and Wilks's Lambda Values Obtained in Linear Discriminant Analysis

| Eigen Value	Canonical Correlation	Wilks's Lambda	Chi-square	Sig.
0.194ᵃ	0.403	0.838	206.457	0.00

Source: Primary Data (SPSS Output)

Table 1.5 Prediction Matrix/Classification Table for Two Levels of Academic Achievement

Classification Statistics		Marks	Predicted Group Membership		Total
			Below 65 Per Cent Marks	Above 65 Per Cent Marks	
Validation Sample (approx 80% of the total cases)	Original Cases (Per Cent)	Below 65 Per Cent Marks	266(45.9%)	313(54.1%)	579
		Above 65 Per Cent Marks	102(17.3%)	488(82.7)	590
	Cross-Validated Cases (Per Cent)	Below 65 Per Cent Marks	265(45 8%)	314(54.2%)	579
		Above 65 Per Cent Marks	105(17. 8%)	485(82.2%	590
Hold Out Sample (approx 20% of the total cases)	Original Cases (Per Cent)	Below 65 Per Cent Marks	78(56.9%)	59(43.1%)	137
		Above 65 Per Cent Marks	17(13. 8%)	106(86.2)	123

Source: Primary Data (SPSS Output)
64.5 per cent of selected original grouped cases correctly classified.
70.8 per cent of unselected original grouped cases correctly classified.
64.2 per cent of selected cross-validated grouped cases correctly classified.
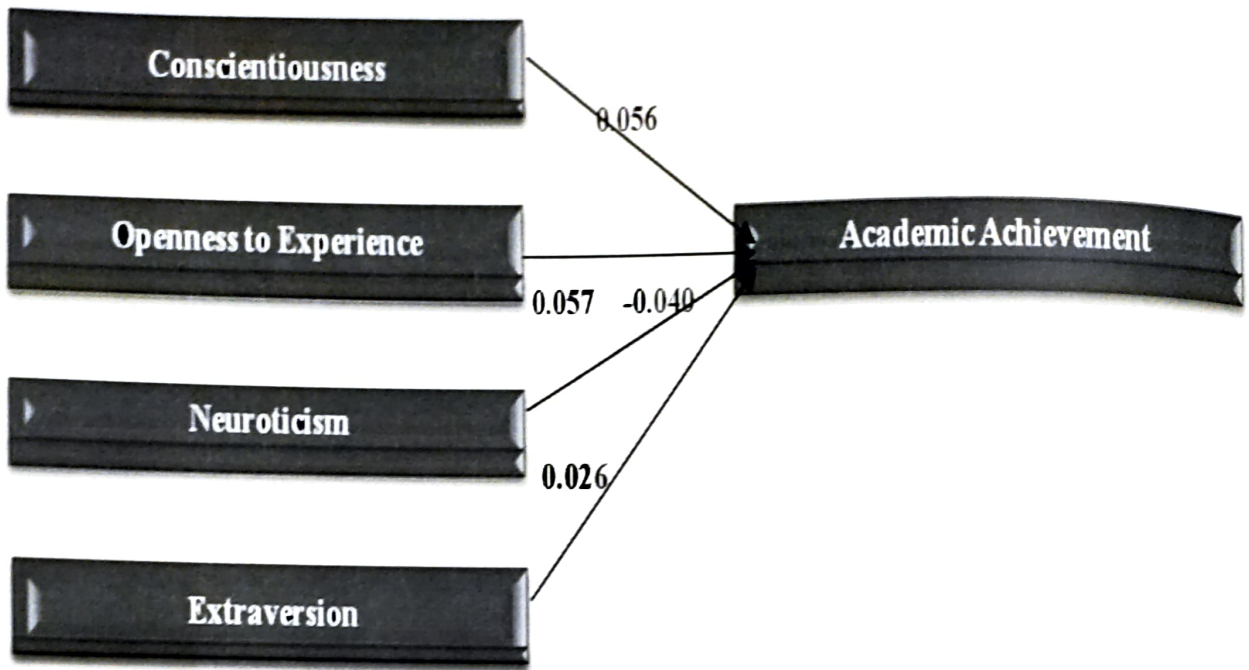
Source: Primary Data (SPSS Output)

Figure 1.2: Model (Validated) Depicting the Underlying Relationship between Big-Five Personality Traits and Academic Achievement

1.6   Results, Discussion and Conclusion

A lot of empirical studies have provided mixed results regarding the relationship of these personality traits with the level of academic achievement. Likewise, present study seeks to determine the impact of these five non cognitive variables (measured by (NEO-FFI) on the level of academic achievement (measured by two levels i.e. above 65% and below 65%) of aspiring professionals studying in various educational institutions of Haryana and Delhi and thus add to the available body of research that highlights the effect of individual differences on the behaviour of an individual. Through LDA, the aforementioned underlying relationship has been examined between the five traits of human personality and the two domains of academic achievement. Table (1.3) thus depicts the values for the unstanderdized canonical discriminant function coefficients. These values would also be helpful in making the decision regarding the acceptance or rejection of the framed alternate hypotheses. Out of the five sub hypotheses, first one is based on the underlying relationship between the first personality domain i.e. neuroticism and academic achievement of aspiring professionals. In case of neuroticism, negative values of both unstanderdized canonical discriminant function coefficient (-0.040) and standardized discriminant coefficient (-0.321), clearly indicate a significant negative contribution of this trait towards the resultant discriminant function. Hence, the

alternate hypothesis ($H_{a1 (i)}$) that "*There is a negative relationship between neuroticism and academic achievement of aspiring professionals*" is accepted.

In case of post-secondary education, the negative relationship between neuroticism and academic achievement can also be verified by the previous studies for e.g., Chamorro-Premuzic & Furnham, (2003a); Chamorro-Premuzic & Furnham, (2003b) and De Fruyt & Mervielde, (1996) identified a negative association between neuroticism and the GPA scores gained by the students.

Similarly, Chamorro-Premuzic & Furnham, (2003b), also identified a negative relationship between neuroticism and the performance on thesis work. Literature also suggests that emotionally unstable or neurotic students are generally prone to the negative effects of anxiety and stress that in turn impair their performance and lead to poor/low level of academic achievement (Suls, Green and Hills, 1998; Costa and McCrae, 1992).

Table 1.3 also depicts the underlying relationship between extraversion and academic achievement. Positive values for both unstanderdized canonical discrimimnant function coefficient (0.026) and standerdized canonical discrimimnant function coefficient (0.199) thus indicate a positive but an insignificant contribution of this trait towards the resultant discriminant function i.e. an increasing level of extraversion

(being more social and friendly) has a little bit positive but an inconsequential impact on the gained level of academic achievement of aspiring professionals. Hence, the alternate hypothesis ($H_{al\ (ii)}$) that *"There is a negative relationship between extraversion and academic achievement of aspiring professionals"* may not be accepted. As the analysis reveals a positive but an insignificant relationship between these two variables, so the aspiring professionals possessing high level of extraversion may attain high level of academic achievement. But the positive impact of this trait cannot be generalized.

Above findings can also be supported by the available literature in this area, for e.g., Rothstein *et al.* (1994), identified positive association between extraversion and class participation grades. Poropat, (2009) have also suggested that the students possessing high level of extraversion can make themselves visible to their teachers, which ultimately lead to more opportunities for them to make their performance easily counted and visible. This effort would ultimately affect their academic achievement in a positive manner. In addition, several previous studies have also failed to find any significant association between these two aforementioned variables like: Duff *et al.* (2004) (GPA), Lounsbury *et al.*, (2003), (course grade), Farsides and Woodfield (2003) (GPA), Bauer and Liang (2003) (GPA), Chamorro-Premuzic and Furnham (2003b) (GPA), De Fruyt and Mervielde (1996) (GPA), Dollinger and Orf (1991) (exam grade). Hence, literature provides a little evidence about the significant relationship between extraversion and academic achievement.

Furthermore, analysis has revealed a highly significant and positive relationship between openness to experience and academic achievement (unstanderdized canonical discrimimnant function coefficient (0.057) and standardized discriminant coefficients (0.472)). An increasing level of openness to experience (being more open and curious towards learning new skills) has a significant and remarkable impact on the gained level of academic achievement of aspiring professionals. Hence, the alternate hypothesis $H_{al\ (iii)}$ that *"There is a positive relationship between openness to experience and academic achievement of aspiring professionals"* is accepted.

Being high on openness basically refers to being open towards learning new things, being always ready for learning new experiences and being imaginative by nature. Literature depicts a number of investigations that can be listed in support of the above finding, for e.g., in some studies this trait has been found to forecast/predict GPA of post secondary students ((Farsides & Woodfield, 2003; Gray & Watson, 2002; Lievens *et al.*, 2002; Phillips *et al.*, 2003; Rothstein *et al.*, 1994), final course grades attained by pupils (Lounsbury *et al.*, 2003), grades attained in psychology exam (Dollinger & Orf, 1991)). Openness is characterized by nonconformity and autonomous behavior (Judge T.A, Higgins, C.A, Thoresen C.J, Barrick M.R, 1999). This kind of flexible and intellectual behavior generally leads to high level of academic achievement.

The fourth personality domain i.e. agreeableness, due to its insignificant discrimination ability, has been excluded from the analysis. Hence, the alternate hypothesis $H_{al\ (iv)}$ that *"There is positive relationship between agreeableness and academic achievement of aspiring professionals"* may neither be rejected nor accepted. Moreover, literature depicts a number of investigations that can be listed in support of the above finding i.e. a number of studies are available depicting the underlying relationship between big five personality traits (measured by using a variety of instruments, for e.g., BFI, NEO-FFI, NEO-PI-R, 5PFT etc) and academic achievement (measured with the help of a variety of methods, for e.g., GPA scores, average exam grade, average essay grade, written performance, classroom performance etc), for e.g., Hair and Hampson, 2006; Bauer and Liang (2003); Lievens *et al.* (2002); De Fruyt and Mervielde (1996); Rothstein *et al.* (1994); Goff and Ackerman (1992); Dollinger and Orf (1991). All these aforementioned studies have also found unable in depicting a significant relationship between agreeableness and academic achievement of post-secondary students. Furthermore, analysis has revealed a highly positive and significant contribution of conscientiousness towards the resultant discriminant function i.e. an increasing level of this trait (being more hardworking, organized and meticulous towards the academic and personal goals) has a considerable and noteworthy impact on the gained level of academic achievement of aspiring professionals. Hence, the alternate hypothesis $H_{al\ (v)}$ may be accepted by saying that *"There is a positive relationship between conscientiousness and academic achievement of aspiring professionals"* is accepted with a strong support.

Being high on conscientiousness basically refers to being persistent, hard working, achievement oriented, self-controlled, responsible, careful and organized.

Literature also depicts a number of investigations that have identified a positive association between possessed level of conscientiousness and post-secondary academic achievement, for e.g., a highly positive association has been identified between level of conscientiousness and GPA scores (Conard, 2006; Bauer & Liang, 2003; Chamorro-Premuzic & Furnham, 2003a; Chamorro-Premuzic & Furnham, 2003b) indicating that more conscientious students generally attain higher GPA than their counterparts. The above association has also been identified between some other measures of academic performance like: final grades (Lounsbury, Sundstrom, Loveland, & Gibson, 2003; Paunonen & Ashton, 2001; Dollinger & Orf, 1991), undergraduate statistics classes (Furnham & Chamorro-Premuzic, 2004) and thesis work (Chamorro-Premuzic & Furnham, 2003b). According to Chamorro-Premuzic & Furnham, (2005), the aforementioned relationship can be explained in terms of level of motivation i.e. hard-working, achievement oriented and organized students are supposed to be more motivated and confident as compared to their counterparts and this level of motivation ultimately leads to higher level of academic accomplishment.

On the whole, it can be seen that the values of conscientiousness and openness to experience are approximately equal, indicating an equal contribution of both

these domains to the resultant function followed by neuroticism and extraversion i.e. these two variables have shown a significant but less contribution to the resultant function (extraversion being the least important). Furthermore, the standardized canonical discriminant function coefficients (like the standardized regression coefficients (beta's) in regression) depicted in analysis provide an index of the importance of each predictor like then did in multiple regression.

The signs of these domains represent the direction of relationship of these independent domains with the two categories of the dependent variable. It can be seen that the resultant sign associated with conscientiousness, openness to experience and extraversion is positive i.e. with a significant increase in the level of tendencies like: achievement orientation, preciseness, curiosity, innovativeness etc, the level of academic achievement of aspiring professionals would also shift to a higher level. On the contrary, the sign associated with neuroticism is negative i.e. an increasing level of stress, anxiety and nervousness would certainly bring a downward shift in the level of academic achievement. The fifth domain i.e. agreeableness, due to its insignificant ability (discriminatory power) has been excluded from the stepwise analysis. Though, literature does not suggest any clue about the reverse or bipolar relationship between personality traits and academic achievement, yet a bi-polar relationship can be explained with the help of the resultant linear discriminant equation.

This means that an individual's marks also affect his/her personality i.e. a change in the level of academic achievement of a student may also bring a change in his/her personality. As this is a linear equation, then by changing the values of total discriminant score (based on the level of academic achievement), the possessed level of these five traits may also get to change up to a certain extent and in a specific direction. Hence, the primary (main) hypothesis H_1 may be accepted by saying that *"There is a significant relationship between personality traits and academic achievement of aspiring professionals"*

Above findings can also be supported with the help of available literature based on nature of association between personality traits and academic performance (see reviews by Chamorro-Premuzic & Furnham, 2004; O'Connor & Paunonen, 2007). Conscientiousness came out as the strongest predictor of academic performance (Chamorro-Premuzic & Furnham, 2004). Openness to experience has also been suggested as a positive correlate of academic achievement (O'Connor & Paunonen, 2007) i.e. personality traits have been considered as significant predictors of academic performance of students at college level (Hogan & Hogan, 1989; Day & Silverman, 1989).

In conclusion, it is seen that out of the five domains of personality only three namely: conscientiousness, openness to experience and neuroticism came out as the most important personality traits that differentiate between the high and low achieving aspiring professionals. High levels of consciousness and openness tend to hike the level of academic achievement. However, high level of neuroticism tends to lower the level of academic achievement of these aspiring professionals. Hence, for raising their achievement standards, it is essential to raise the level of conscientiousness and openness along with lowering the level of neuroticism and extraversion in these aspiring professionals. Though, for the present sample, extraversion has shown an insignificant relationship with the academic achievement and agreeableness has been excluded from the analysis, yet the importance of these variables cannot be fully ignored and should be taken in to account while formulating personality development strategies for these aspiring professionals.

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