Investigating Personality Traits and Intelligence as predictors of Academic Performance and Academic Motivation.

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Submitted to the National College of Ireland, April 2019

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Acknowledgements

My thanks to all participants who to part in the study, as the research would not of been conducted without those who volunteered. To my friends who made the journey with me, and stayed in college after hours to help each other. To all my lecturers throughout the last three years that have equipped me with the new skills and have challenged the way I think. Lastly, I would like to thank my supervisor, Dr Conor Nolen, who provided guidance and support throughout the whole process.

Abstract

The current study investigated personality traits and intelligence as predictors of academic performance (AP) and academic motivation (AM). The aim of the study was to determine to strongest and most accurate predictor of AP and AM. Furthermore, to establish Intelligence as a predictor of academic motivation. It was hypothesised that conscientiousness will out do Intelligence in predicting AP. That neuroticism will negatively impact AP. Lastly, that intelligence will be a significant predictor of AM. Research was carried out with 44 females and 35 males (N=79). Participants completed The Academic Motivation scale, The Big Five Inventory 10-item short form and the Ravens Progressive Matrices 9-item abbreviated version. Two multiple regressions were conducted to analysis the predictive ability of personality traits and Intelligence on AM and AP. Conscientiousness proved to be the strongest predictor of both AM and AP. Followed by intelligence and neuroticism. finally, intelligence did not have a significant impact on AM. The findings of the current study may add value to educational psychology. By identifying students who are at risk of poor AP allows for interventions to be put in place before negatively impacting their AP.

Contents

Literature Review

Academic performance

Academic performance refers to a student's achieving their academic potential (Chamorro-Premuzic & Furnham, 2008). Previous Researchers have been interested in discovering the crucial variables of predicting academic performance (AP), for numerous years. There is considerable real-world value in being able to determine the predictors of academic ability (Chamorro-Premuzic & Furnham, 2008. Nowadays, AP remains to be an accurate predictor of career path and even further accomplishment in life (Chamorro-Premuzic & Furnham, 2008). Therefore, identifying predictors of AP is of great benefit as it could improve an individual AP and subsequently future success in life. Factors often associated with predicting AP are personality traits, intelligence and academic motivation (AM) (Stumm, Hell & Chamorro-Premuzic, 2011). The dominant and most frequent measure of AP is overall grade average (Kuncel, crede & Thomas, 2005). Individuals grade average is often linked variables such as intelligence (Strenze, 2007). Korbin, Patterson, Shaw, Mattern and Barbuti (2008) conducted a meta- analysis revealing a strong association between overall average grade and AP at both secondary and tertiary levels of education. Such findings support the notion that average grade is reliable. Educational research has suggested that grades are the most frequent and valid measure for predicting AP (Atkinson & Geiser,2009) Thus, suitable for this study. Academic performance is said to be enabled by academic motivation (AM). Research illustrates that AM mediates the relationship between AP and variables that can predict AP (McGoewn, 2014)

Academic motivation

Previous literature has implied that academic motivation significantly contributes to AP (Linnenbrik & Pintrich, 2002). Motivation has been shown to account for AP, even when

other factors such as intelligence are controlled for (Logan, Medford & Hughes, 2011). Thus, emphasising a need to understand the effect of motivation within an academic context (McGeown, 2014). Acedemic motivation (AM) can be defined as a students desire and willingness towards academic performance (Linnenbrik & Pintrich, 2002). The concept of AM is composed of drive, persistance and level of interest towards the process of learning (Linnenbrik & Pintrich, 2002). AM various widely between people as it is based on individual experiences and consequences (Linnenbrik & Pintrich, 2002). The role motivation has on academia is suggested to be significantly more important than intelligence in predicting academic performance (Ayub, 2010; Tella, 2007).

Theories of motivation imply that individuals are driven by a desire to grow in order to attain fulfilment (Maslow, 1954) Thus, motivationl theories assume that people are actively focused towards self-development (Linnenbrik & Pintrich, 2002). Self-determination theory (SDT) was developed by Deci and Ryan (1985) as a way of investigating what factors pursue an individual to behave. SDT suggest that motivation is based on a continuum as opposed to a category (Ryan & Deci, 2000). Therefore, individuals cannot be labelled as motivation or unmotivated. SDT has identified three distinct types of motivation intrinsic, extrinsic and a-motivation (Vansteenkiste, Lens & Deci, 2006). Each type has a unique consequence on academic performance (McDevitt & Ormrod, 2008).

For instance, a-motivation is correlated with poor AP and high dropout rates (Van Den Berg & Coetzee, 2014; Beaudoin, 2006). A-motivation refers to those who place no value on academic achievement (Van Den Berg & Coetzee, 2014). Whereas, those intrinsically motivated report significantly greater academic performance (Radi, 2013; Goodman et al., 2011). Cognitive evaluation theory (CET) purposed by Deci & Ryan (1985) as a sub theory of SDT. The CET explores the variability within intrinsic motivation. Those who display high intrinsic motivation often seek intellectual simulation and derive

satisfaction from obtaining new knowledge (Cetin, 2015). Factors such as attendance, initiative and attitude toward academia can be determined by intrinsic motivation which in turn manifests in enhanced academic performance (Willigham, Pollack & Lewis, 2002). On the other hand, those who are extrinsically motivated simply pursue education in order to achieve a goal as opposed to the gratification of learning (Cetin, 2015). Extrinsic motivation has three subcategories. External regulation (engagement in academic ordinated behaviour in order to obtain external rewards) (Zimmerman, 2012). Introjected regulation (adopting the importance of academic motivation due to environmental factors) (Deci &Ryan, 2002). Lastly, identified regulation (deliberately choosing to identify oneself with academic standards) (Zimmerman, 2012).

The Academic Motivation scale (Vallerand et al., 1992) operationalizes the self-determination theory by measuring intrinsic, extrinsic and a-motivation within an academic context. While academic motivation acts an as an enabler for high AP, variables that predict AP must also be discussed. Goodman, Jaffer, Keresztesi & Mamdani (2011) found that both extrinsic and intrinsic academic motivation has a significant positive association with AP. Goodman et al., (2011) suggested this is the case because AM influences the amount of effort put forth. Khalaila, (2015) illustrated that AM is a significant moderator between self-concept and AP. Indicating that AM, may in fact moderate the relationships between other variables (such as PT and IQ) and academic performance.

Personality traits

Personality can be defined as “individual differences in characteristic patterns of thinking, feeling, and behaving” (American Psychological Association [APA], 2017). Goldberg (1992) proposed that there are five crucial factors of personality neuroticism, extraversion, openness, agreeableness and conscientiousness. Costa and McCrea (1987) further evaluated this claim and labelled the five-factor model (FFM). Individuals either score

high or low on those five factors. Each factor is independent from each other. Neuroticism outlines one's emotional stability and overall temperament. Extraversion reflects an individual's activity and sociability (Costa & McCrae, 1987). Openness refers to willingness to try new experiences and broad-mindedness. Whereas, agreeableness is to do with our relationships with others and friendliness (Costa & McCrae, 1987). Lastly, conscientiousness is our ability to regulate impulsivity, orderliness and persistence (Costa & McCrae, 1987). Certain literature may argue that not all personality dimensions can be accounted for by the big five. However, empirical evidence has used the big five dimensions to accurately assess personality and its relationship with academic motivation and academic performance

The FFM has been previously related to academic success and even job performance later on in life (Judge, Jackson, Shaw, Scott & Rich, 2007). The FFM is regarded as the most prevalent theoretical personality framework. The inventory is remarkably universal and has shown to be successful in a multitude of countries (McCrae et al 2005; Schmitt et al., 2007).

Personality traits and Academic Motivation

Prior research demonstrates the relationship between personality traits and academic motivation. It was found that the FFM may directly impact willingness to perform, in other words motivation (Poropat, 2009). Komarraju and Karau (2005) display interesting findings. Their results suggest that openness as well as extraversion has the ability to best predict engagement motivation (which they classify as motivation towards improving ones-self). While consciousness followed by openness is strongly correlated with achievement motivation (motivation to persist to attain success) (Komarraju & Karau, 2005). Lastly, they discuss a positive relationship between neuroticism and avoidance motivation (withdrawal from academic engagement). Correspondingly, there was a negative association between conscientiousness, openness and avoidance motivation. (Komarraju, Karau & Schneck, 2009).

Achievement motivation is often shown to have a strong positive association with both extraversion and conscientiousness, and a negative correlation with neuroticism (DeGuzman, Calderon & Cassaretto, 2003; Busato, Prins, Elshout & Hamaker, 2000). Furthermore, Payne, Youngcourt and Beaubien, (2007) exhibit comparable findings. They suggest that individuals who display high levels of neuroticism also score high in avoidance motivation. Additionally, said neurotic individuals tend to display a fear of failure. While conscientiousness, openness and extraversion can be linked to high levels of academic motivation (Payne et al., 2007). Similarly, it was revealed that conscientiousness accounts for both intrinsic and extrinsic academic motivation, while openness can only predict intrinsic motivation. Additionally, that extraversion may be a predictor of extrinsic motivation but not intrinsic (Komarraju, Karau & Schmeck, 2009).

Personality Traits and Academic Performance:

While previous research implied that personality traits linked with academic success, initially the research was undermined by inconsistent findings and flawed methodology (Woodfield, 2003). Study's exhibited no clear trends and erratic conclusions (Woodfield, 2003). The growing knowledge regarding personality traits (particularly, the five-factor model) allowed for a greater theoretical framework for investigating its role in academic performance. Unlike The development of IQ test, measuring personality traits was not designed to be an assessment of AP. However, one cannot deny the relevance personality traits offer to predicting academic ability.

In comparison to academic motivation, more research is conducted regarding the relationship between personality traits and academic achievement (Komarraju, Karau & Schneck, 2011). A considerable amount of research falls under the belief that intelligence cannot solely predict academic achievement. In fact, it is suggested that other variables go beyond what can be explained by intelligence to understand academic performance

(Duckworth, Peterson, Matthews & Kelly, 2007). Willigham, Pollack & Lewis, (2002) suggested that PT can predict AP more than intelligence. Consciousness is often associated with AP. Prior literature displays support for that fact that individuals who score high on consciousness often have display high AP (Conard, 2006; Premuzic &McDougall, 2003). Additionally, Noftle and Robins (2007) show further support for this finding. Proposing that conscientiousness is the strongest predictor of academic performance. This conclusion is in line with Dumfart and Neubaur, (2016) study. They state that conscientiousness is crucial in predicting AP. Furthermore, Vedel, (2014) conducted a meta-analysis of non-cognitive predictor of AP. It was revealed that conscientiousness has the strongest correlation with AP. This consistent link is due to the fact that conscientiousness is related with persistence, self-discipline and even a goal-orientated nature (Chamorro-Premuzic & Furnham, 2010). Likewise, openness and agreeableness show an association with academic performance (Farside & Woodfield, 2003). Openness has been suggested to have a positive impact on AP due to the intellectual curiosity facet within the trait (Von Stumm, Hell, & Chamorro-Premuzic, 2011). Extraversions impact on AP is age dependant, extraversion was suggested to only effect AP at a younger age particularly in primary schools (O'Connor & Paunonen, 2007). Research indicates a negative relationship between neuroticism and AP (Poropat, 2009).

Personality traits are also often linked with intelligence and academic motivation (Swanber & Martinsen, 2010; Clark & Schroth, 2010). In fact, Heaven and Ciarrochi, (2012) infer that personality traits and IQ interact with one another. Dumfart and Neubaur (2016) found that conscientiousness and IQ together could explain 40% of variance in AP, thus, both variable are crucial in the prediction of AP. Given the reliable link between academic performance and IQ it would be insufficient to merely discuss personality without the mention of intelligence (Gottfredson, 2002).

Intelligence and Academic Performance

Intelligence as a factor must also be considered to adequately assess academic ability. Ultimately, intelligence can be categorized as a cognitive ability that enables you to acquire and apply knowledge (Gottfredson, 2002). It is suggested that intelligence is the most documented predictor of AP and therefore, has a rich record of support (Yen, Konold, McDermott, 2004). This may be due to that fact that IQ test were designed to predict academic success or failure (Siegler,1992). Existing literature would argue that intelligence is a stronger and more accurate predictor of academic success, over all other variables including personality traits (Gottfredson, 2002). For example, Karbach, Gottschling, Spengler, Hegewald, and Spinath, (2013) display support for Intelligence as the strongest predictor of AP. Their study revealed that intelligence accounted for the largest amount of variance in both domains (maths 29% and language 27%) examined. Furthermore, Deary, Strand, Smith & Fernandez (2007) found intelligence to be the strongest predictor of AP in twenty-five different academic subjects. IQ accounted for variance ranging from 48% (maths) to 18% (art). Rhode and Thompson (2007) further show support for the major role intelligence plays in relation to AP.

Other research concluded that IQ significantly predicts both course grade and grade-point average result, while personality was only correlated with course grade (Ridgell & Lounsbury, 2004). Supporting the notion that intellectual ability is the strongest predictor of AP. Yet another study conducted found that both personality traits and general intelligence account for variance within AP (Heaven & Ciarrochi, 2012). However, once again intelligence proved to be the strongest predictor of academic achievement followed by conscientiousness and openness (Heaven & Ciarrochi, 2012). They further expressed that intelligence and personality traits interact with one another, in particular that conscientiousness is strongly associated with a high IQ (Heaven & Ciarrochi, 2012).

Similarly, Laidra, Pullmann and Allik (2007) do not deny the impact personality traits imposes on AP. Their study demonstrates that Openess, agreableness and conscientiousness positively correlated with acdemic performance, while neuroticism negatively correlates with academic performance. However, they concluded that the greatest predictor is in fact IQ and not personality (Laidra et al., 2007). Jokela et al., (2009) suggestes that intellience not only predicts AP but may in fact predict future success.

Such research proposes a strong agrument that academic performance relies more so on intelectual ability rather than personality traits. However, this provides an inconsistancy as their is existing evidence suggesting that personality traits can account for AP more so than IQ and vice versa.

Intelligence and academic motivation

While the link between intelligence and academic performance has been extensively researched, the same cannot be said about academic motivation. Blackwell, Trezesniewk and Dweck (2007) investigated the role of extrinsic motivation within intelligence, by providing a material incentivises for completing an IQ test. Their results indicate that IQ scores increased due to the incentivises provided. Thus, supporting the notion that IQ plays a role in AM. Dweck and Leggett, (1988) establish a motivational model to investigate individual's perception regarding their intelligence and motivation. They suggest that different theories of intelligence provide a different academic outcome. The incremental theory refers to the belief that intelligence can be changed and improved. While entity theory is the belief that intelligence is fixed. Dweck & Leggett, (1988) revealed that those who believe that intelligence is malleable have higher motivation, and as a result greater academic performance. This finding is consistent throughout literature. More recently, research indicated that a student's personal view on their own intelligence has a direct impact on their motivation (Haimovitz, Wormington and Corpus 2011). Their results mimic that of previous

findings, belief that intelligence is fixed result in lower self-reported academic performance as well as motivation (De Castella & Byrne, 2015) Furthermore, Chen, Chen, Dsi and Chen, (2018) also found evidence for the incremental theory of intelligence to be a strong predictor of student academic motivation. Literature supports the notion that beliefs regarding one's own intelligence has a direct implication for motivation. However, while previous research has linked intelligence to motivation, majority of findings reflect the impact of ones beliefs on intelligence as opposed to intelligence itself. To the authors knowledge their is little to no research regarding the direct impact of IQ on academic motivation.

Rationale

College students are at an essential point of their lives, that may dictate what their future will look like (McGeown, 2014). For example, employment opportunities. Therefore, understanding factors that can enhance AM and AP is crucial. Identifying such factors has important implications on learning outcomes, as it identifies who is at risk of having a poor AP (O'Connor & Paunonen, 2007). Being able to identify which students are at risk of being a-motivated will allow for interventions to occur before it negatively impacts their academic performance.

Defeyter, Caers, Vigna & Berings (2012) conducted a longitudinal study that investigated the relationship between big five personality traits and AP. They concluded that AM acts as a moderating variable in this relationship. However, AM is suggested to be a significant predictor of acadmeic performance on its own (Tavani & Losh, 2003). Thus, providing evidence for the predictive ability of PT and IQ in terms of academic motivation. Personality traits has been established as a predictor of academic motivation (Komarraju & Karau, 2005). However, there is little to no research regarding intelligence as a predictor of academic motivation. The current study will investigate the predictive ability of intelligence. Filling this gap will add value to the field of educational psychology.

Penultimate, as can be seen from the above literature review there is evidence for personality traits being the strongest predictor of academic performance (Chamorro-Premuzic & Furnham, 2007). However, other research would argue that intelligence is the strongest predict of academic performance (Heaven & Ciarrochi, 2012). Thus, providing inconsistent findings regarding the strongest predictor of AP. While it is valuable to know that both personality traits and intelligence are predictors of academic performance, it is of great importance to understand which is the strongest. The current study will address this inconsistency and attempt to determine the most accurate predictor of AP.

Lastly, Komarraju, Karau & Schmeck, (2009) highlight the lack of research that simultaneously examines the role of personality traits on AP and AM. The current study investigates this and goes beyond what Komarraju et al, (2009) view as a future requirement, to include another predictor variable, IQ.

Aims

1) To determine the strongest predictor of academic performance.
2) To establish intelligence as a predictor of academic motivation.

Hypothesis

1) Conscientiousness will be the strongest predictor of AP, from all other variables.
2) Those high in neuroticism will display low levels of AP.
3) Intelligence will be a significant predictor of AM.

Methods

Participants

Participants were selected via the internet, anyone who volunteered to click the link and fill out the survey was recruited. The total number of participants were 79 (N=79) college student. Of which 35 are male (44.3%) and the remaining 44 are female (55.7%). Coded as (male=0, female=1). The age range is 18-32, with a mean age of 20.94. the standard deviation was reported at 2.249. Snow ball as well as convenient sampling was incorporated due to time and resource constrains. Participants received no compensation for taking part in the study. The sample consisted of college students. The study requests information on first semester of first year exam results, thus those who did not complete their first semester of first year are excluded from the study. Those under the age of 18 or that belong to vulnerable groups will be excluded. Inclusion criteria includes being a college student and completed their first semester of first year. Participants can belong to any college institution, all age groups and any gender can part take.

Materials/Measures

An information sheet, consent form and debrief was produced by the researcher for the purpose of this study. The Academic motivation scale, the big five inventory 10-item short form and the Ravens progressive matrices 9-item abbreviated version was used. Other materials include a computer and IBM SPSS statistics 25.

Academic performance

Information regarding academic performance will be collected by asking participants to provide information on their first semester of first year exam results. Participants select one of five options 0-39%, 40-49%, 50-59%, 60-69% and 70% or higher. Exam results was

chosen for the assessment as the result was provided by a qualified lecturer and thus, should be valid.

Raven progressive matrices

The Raven Progressive Matrices (RPM) is a nonverbal measurement of fluid intelligence. It is presented in a multiple-choice format (see appendix A). Completing the RPM involves matching patterns. Participants are presented with a box that contains several figures, which are related by specific rules. A section of the box is missing, and participants are provided with 6-8 similar figures that could fit in the box. They select one which they believe best corresponds with the other figures in the box by deciding the rules of each box/question. Each question progressively getting harder than the last. The RPM was originally published in 1938, with a total of sixty questions. A nine-item short from (RPM) derived from the original set was used, as a way to save time. As this study has limited time constraints, this particular version of the RPM is more suitable. The short form of nine items can accurately predict intelligence as well as the original set. Therefore, the nine-item questionnaire preserves significant reliability as well as validity. Psychometric components of the abbreviated version are said to mimic that of the full version. While the short form is said to be completed 75% faster.

Big five personality inventory

The big five personality inventory short- form (Rammstedt & John, 2007) will be used (see appendix B). The participants will be presented with ten statements. For example, “I see myself as someone who is reserved”. In which participants give a response on a five point Likert scale. Ranging from “disagree” =1, slightly “agree” =5. Higher scores indicate a higher level of each trait. A ten-item short form was developed for research under restricted time constrains by Rammstedt and John (2007). It asses all dimensions of the big five only using two questions per dimension. Question 1 and 6 investigate levels of extraversion,

question 2 and 7 asses' agreeableness. While question 3 and 8 look at conscientiousness and 4 and 9 at neuroticism. Lastly, question 5 and 10 will investigate openness. Five of the ten question are reverse coded (1, 3, 4, 5, 7). The ten-item version was shown to display psychometric properties fairly equivalent to the full version (Rammstedt & John, 2007). Cronbach's Alpha revealed internal reliability of .258.

Academic motivation scale

The academic motivation scale (Vallerand et al., 1992) will be used to assess academic motivation (See appendix C). It is a 28-item scale developed based on self-determination theory (Vallerand et al., 1992). The AMS measures seven subscales, each consisting of four items to determine participants type of motivation. Subscales are added together to obtain a total academic motivation score. The AMS accounts for variation within motivation, including intrinsic, extrinsic and a-motivation. Questions evaluating a-motivation are reverse scored (5, 12, 19, 26). Originally designed for college students thus, suitable for this study. Questions refer to why the participants attend college, for example "Because I experience pleasure and satisfaction while learning new things". Participants are asked how much they agree with a statement on a five point Likert scale ranging from completely "disagree" = 1 all the way to "agree" = 5. The AMS is commonly used due to its reliable internal consistency of .83 to .86 (Vallerand et al., 1992). The Cronbach's Alpha for the 28 AMS items were .941 respectively. Thus, found to be highly reliable.

Design

It is a quantitative study, that uses a within-groups design, as all participants will endure the exact same conditions as each other. Criterion variable are academic performance and academic motivation. While the predictor variables are personality traits and intelligence.

Procedure

Participants were recruited via the internet, using websites such as Instagram and Facebook. The questions were presented on a google docs from. Prior to the questionnaire being filled out the participant's rights and role in the were clearly outlined. The participants then provided written consent by thinking a box stating that they understand and volunteer to part take in the study. Participants then had to state that they were 18 or older by checking a box. If the participants did not consent or were younger than 18 they could not continue with the questionnaire. Firstly, demographic were assed. Such as age and gender. Once consent and demographics were obtained the participant was presented with three questionnaires. which totalled to fifty questions. The full completion of the questionnaire is ten minutes. The questionnaires used were the Big five inventory-10 item short form, followed by the academic motivation scale, then lastly the Ravens progressive matrices 9-item abbreviated version. Participants were then presented with a debriefing sheet. Outlining how to contact the researcher or supervisor if necessary, and contact information for the Samaritans mental health group was also provided for the unlikely event that the questionnaire caused distress. The debriefing from was also used to thank each of the participants. Once all responses were collected the google docs form was transformed to an excel spreadsheet, then into IBM SPSS statistics 25. All variables were computed and recoded in SPSS.

Results

Table 1

Frequencies for the current sample (N =79)

Variable	Frequency	Valid Percentage
Gender		
Male	35	44.3
Female	44	55.7
Academic Performance		
A	18	22.8
B	31	39.2
C	18	22.8
D	8	10.1
E	4	5.1

The results in Table 2 below display the mean, standard error, mean, median, standard deviation and range for all personality traits, IQ and academic motivation. Mean scores for Academic motivation were relatively high indicate that participants displayed high levels of academic motivation (*M*= 102.06, *SD*= 21.07). Mean scores for all personality traits were relatively high (*M*=7.30-606). Indicating that participants displayed higher levels of agreeableness, and lowest levels of neuroticism. Mean scores for IQ were relatively low. Trimmed mean was investigated, the score was 0.04 for the big five scale, and 0.85 for AM, this indicates that outliers did not have an effect on the general sample size. Histograms probability plots and boxplots were investigated for kurtosis and skewness which showed Data is relatively normally distributed. Further investigation of Kolmogorov-Smirnov tests was carried out to assess normality, revealing a score .059 for academic motivation, suggesting data was normally distributed. All other variables indicted scores below .05 suggesting the data is non-normally distributed.

Table 2

Descriptive statistics of all continuous variables

	Mean (95% Confidence Intervals)	Std. Error Mean	Median	SD	Range
Academic Motivation	102.06 (97.34-106.78)	2.37	106.00	21.07	40-139
IQ	4.87(4.30-5.45)	.288	5.00	2.56	0-9
Openness	6.96(6.52-7.40)	.222	7.00	1.97	2-10
Conscientiousness	6.73(6.33-7.14)	.204	7.00	1.82	2-10
Extraversion	6.80(6.37-7.22)	.214	7.00	1.90	2-10
Agreeableness	7.30(6.98-7.63)	.161	8.00	1.43	2-10
Neuroticism	6.06 (5.60-6.58)	.246	6.00	2.18	2-10
Age	20.94(20.43-21.44)	.253	21.00	2.25	18-32

Inferential statistics

Table 3

Correlations between all continuous variables.

Variables	1	2	3	4	5	6	7	8
1. IQ	1							
2. Openness	.11	1						
3. Conscientiousness	.20	.28*	1					
4. Extraversion	.12	.30**	.06	1				
5. Agreeableness	.08	.28*	.34**	.13	1			
6. Neuroticism	-.32**	-.30**	-.09	-.59**	-.17	1		
7. Academic Performance	-.34**	-.32**	-.38**	-.15	-.05	.34**	1	
8. Academic Motivation	.12	.39**	.37**	.28*	.28*	-.32**	-.56**	1

Note. Statistical significance: *$p < .05$; **$p < .01$; ***$p < .001$

Multiple regression analysis was performed to investigate H1, how well Academic Performance could be explained by personality traits (conscientiousness, openness, extraversion, agreeableness and neuroticism) and IQ.

Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. The correlations between the predictor variables and the criterion variable included in the study were examined (see Table 3 for full details). Conscientiousness, neuroticism and IQ were significantly correlated with the criterion variable, and these significant effects ranged from r = 0.34 to -0.35. The correlations between the predictor variables were also assessed with r values ranging from -0.53 to -0.604. while a correlation is present, it is not high enough to effect multicollinearity, thus, the data is suitable for a regression. These results indicate that there was no violation of the assumption of multicollinearity and that the data was suitable for examination through multiple linear regression analysis. The Collinearity Tolerance values for the predictor variables ranged from .570 to .871. The VIF (variation inflation factor) for the predictor variables ranged from 1.147 (neuroticism) to 1.754 (IQ) These results further show that there was no violation of assumptions of multicollinearity and that the data is suitable for examination through a multiple linear regression. The Mahalanobis Distance indicated that outliers did not have an effect on the sample size (.20.28) (See appendices D).

The six predictor variables explained 24.1% of variance in academic motivation ($F(6, 72) = 5.136$, $p < .001$). Three of the six variables were found to uniquely predict academic motivation to a statistically significantly level: conscientiousness ($\beta = -.28$, $p < .001$), Neuroticism ($\beta = .27$, $p < .001$, IQ ($\beta = -.216$, $p < .001$).

Table 4

Multiple regression model predicting Academic Performance

	R^2	Adj R^2	B	B	SE	CI 95% (B)
Model	.24**					
IQ			-.22*	-.09	.05	-.185 / -.00
Openness			-.19	-.11	.06	-.23 / .02
Conscientiousness			-28*	-.17	.07	-.30 / -.04
Extraversion			.09	.05	.07	-.09/ .19
Agreeableness			.14	.11	.08	-.058 / .27
Neuroticism			.27*	.14	.07	.005 / .27

Note. Ajd R^2 = Adjusted R-squared; β = standardized beta value; B = unstandardized beta value; SE = Standard errors of B; CI 95% (B) = 95% confidence interval for B; N = 79; Statistical significance: *p < .05; **p < .01

Multiple regression analysis was performed to investigate H2, how well Academic Motivation could be explained personality traits (conscientiousness, openness, extraversion, agreeableness and neuroticism) and IQ.

Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. The correlations between the predictor variables and the criterion variable included in the study were examined (see Table 3 for full details). Conscientiousness was significantly correlated with the criterion variable, and these significant effects ranged from r = .35. The correlations between the predictor variables were also assessed with r values ranging from .06 to -.60 These results indicate that there was no violation of the assumption of multicollinearity and that the data was suitable for examination through multiple linear regression analysis. The Collinearity Tolerance values for the predictor variables ranged from .570 (neuroticism) to .871 (IQ) The VIF (variation inflation factor) for the predictor variables ranged from 1.147 (neuroticism) to 1.754 (IQ) These results further show that there was no violation of assumptions of multicollinearity and that the data is suitable for examination through a multiple linear regression. The Mahalanobis Distance indicated that outliers did not have an effect on the sample size (.20.28) (See appendices F).

The six predictor variables explained 20.7% of variance in academic motivation ($F(6, 72) = 4.397$ $p < .001$). one of the six variables were found to uniquely predict academic motivation to a statistically significantly level: conscientiousness ($\beta = .24$, $p < .001$).

Table 5

Multiple regression model predicting Academic Motivation

	R^2	Adj R^2	B	B	SE	CI 95% (B)
Model	.27**					
IQ			-.00	-.01	.00	-1.8 / 1.8
Openness			.19	2.1	.19	-.38 / 4.5
Conscientiousness			.24*	2.9	.24	.24 / 5.5
Extraversion			.08	.93	.08	-1.95/ 3.8
Agreeableness			.11	1.6	.12	-.70/ 4.9
Neuroticism			-.18	-1.8	-.18	-4.4 / .82

Note. R^2 = R-squared; Ajd R^2 = Adjusted R-squared; β = standardized beta value; B = unstandardized beta value; SE = Standard errors of B; CI 95% (B) = 95% confidence interval for B; N = 398; Statistical significance: *p < .05; **p < .01

Discussion

The present study sheds light on the relationship between personality traits, IQ, academic performance and academic motivation. The aim of the current study was to uncover the strongest and most accurate predictor of AP. While prior research has investigated this, the findings remained inconsistent. In addition, research indicates a correlation between IQ and academic motivation. However, there is little to no research conducted on direct predictability of IQ on AM according to the authors knowledge. The first hypothesis proposed is that conscientiousness will be the strongest predictor of AP. Accordingly, hypothesis one is supported. The second hypothesis suggested that those high in neuroticism will display low levels of AP. The data does not support the second hypothesis. Lastly, hypothesis three stated that IQ will be a significant predictor of AM. Once again, this hypothesis is rejected.

The results show that conscientiousness is the strongest predictor of AP. Accordingly, hypothesis one is accepted. This finding is consistent with prior research (Noftle & Robins, 2007; O'Connor & Paunonem, 2007). Defeyter et al., (2012), demonstrate comparable findings. They found conscientiousness to have the most significant relationship with AP. They attribute this link to the self-discipline and persistent nature of those who display high levels of conscientiousness. Vedel, (2014) exhibited similar findings. Conscientiousness was found to have to most significant contribution to AP between all non-cognitive traits examined. Vedel (2014) attribute this finding to the impulse control and self-regulating behaviors shown by those with high levels of conscientiousness. Conscientiousness facilitates goal-orientated behaviors and thus, AP (Vedel, 2014). The facets within conscientiousness were not assed in this study. Within the big five personality traits conscientiousness is the strongest and most consistent predictor of AP (Furnham, 2012; Poropat, 2009). The result infers that if one's conscientiousness level increases subsequently so does their AP score.

Due to the stable and robust impact of conscientiousness on AP, research has implied that, high levels of conscientiousness can compensate for low IQ (Wood & Englert, 2009). Hence, those with a low IQ can still out do their counterparts that display a high IQ but low levels of conscientiousness (Moutafi, Furnham, & Paltiel, 2004). Thus, highlighting the crucial impact conscientiousness has on AP. This finding is of great interest for college institutions, lectures and students concerned with increasing their AP (Vedel, 2014).

The results suggest a significant positive relationship between IQ and AP. The relationship between intelligence and AP is consistent throughout literature (Furnham et al., 2011). While this is important to note, the purpose of this study was to identify the strongest predictor of AP. In that case, the present finding contradicts that of Chamorro-Premuzic & Furnham, (2008) that indicate IQ to be the most accurate predictor of AP. Prior research concluded that IQ can account for the largest amount of variance in AP (Karbach et al., 2013; Deary et al., 2007). However, the findings of the current study show that IQ proved to be the second strongest predictor in the present study of AP. Furnham, (2012) illustrate comparable findings to that of the current study. Their study revealed that conscientiousness is the most significant predictor of AP followed by IQ. This may be due to the notion that conscientiousness and IQ are strongly correlated and was suggested to interact with one another (Heaven & Ciarraochi, 2012). This belief is in line with the current findings and that of previous researchers as conscientiousness and IQ proved to be the stable predictors of AP (Furnham, 2012). This finding proposes that increasing a student's IQ will positively benefit their AP. However, what will have a stronger impact on AP, is level of conscientiousness. While this conclusion may seem straightforward it lends support to previous research and helps to identify interventions that can assist those at risk of poor AP.

No support was found for hypothesis three, that those with high levels of neuroticism will display lower AP. The results revealed high levels of neuroticism result in a higher AP.

This contradicts previous studies highlighted. Payne et al, (2007) show further support for this finding. As levels of neuroticism increased subsequently avoidance motivation levels also increased. Furthermore, Furnham et al, (2013) demonstrated a weak correlation between AP and neuroticism. However, in the current study neuroticism proved to be a significant predictor of AP. Thus, indicating that an alternative theory is needed to explain this relationship.

Upon further investigation Defeyter et al., (2012), found support that neuroticism has a positive effect on AP. While this finding contradicts certain literature, Defeyter et al., (2012) propose the positive relationship may be attributed to the moderating role of self-efficacy. Self-efficacy refers to an individual's personal believe of their capabilities (Bandura, 2006). Defeyter et al, (2012) suggest that those who display high level of neuroticism often display high levels of self-efficacy and therefore, a high level of exam success belief. According to Ruthig et al, (2008), individuals who perceive academic failure to lack of effort rather than lack of ability will display higher AP. The relationship between Self-efficacy and AP is strongly established (Khalaila, 2015). Defeyter et al., (2012), demonstrated that neuroticism may be strongly associated with high levels of self-efficacy and therefore a high AP.

Furthermore, an alternative theory for the positive role of neuroticism in predicting AP was demonstrated in O'Sullivan's, (2011) study. O'Sullivan, (2011) found that eustress is a predictor of AP. The concept of eustress refers to a positive psychological response to a stressor in one's environment. O'Sullivan, (2011) demonstrate that eustress may act as a motive towards achieving a high AP. Those with high levels of neuroticism often display high levels of stress and are often anxious (Costa & McCrae, 1987). In turn the nature of those high in neuroticism may be of benefit when presented with academic stressors, as they can respond positively, by the concept of eustress, resulting in a high AP. O'Sullivan (2011)

also found support for the notion that self-efficacy and eustress are highly correlated. Both concepts are linked with neuroticism. Thus, the facets within neuroticism may play a role in promoting high AP. Furthermore, other literature revealed that those who reported higher levels of stress also achieved a high AP then those with a lower level of stress (Monk, 2006). As expressed by Shailhk & Deschamps, (2006) college students experience a lot of academic stress. This finding implies that academic settings would benefit from a certain level of stress. The presentation of stressors may be productive in achieving a high AP, for those who exhibit high levels of neuroticism. While too much stress is often found to be detrimental, the elimination of stress completely may also have a negative effect. An optimum level of stress within an academic setting should be investigated on order to promote high AP.

Rosander and Backstrom, (2014) investigated the predictive ability of PT on AP using a longitudinal design. While they hypothesized, that neuroticism would have a negative impact on AP, the results showed that the opposite is true. Similar to the current study, neuroticism was found to predict high AP. Rosander and Backstrom, (2014) further measured facets within each personality trait. They suggest that the anxiety component linked to neuroticism may install a fear of failure which in turn pushes one to achieve. Therefore, resulting in a high AP. They infer that, those high in neuroticism will avoid future failure. Rosander and Backstrom, (2014) concluded that it is better to be a bit neurotic to achieve academic goals. The present finding proposes that certain facets of neuroticism may be beneficial for AP. Future research is required to investigate the robust effect of neuroticism in achieving AP.

Regarding the second criterion, academic motivation proved more difficult to predict. Komarraju et al., (2009) found that personality traits account for AP more so than AM. Which is in line with the current study as only one personality trait proved to be a significant predictor of AM. Conscientiousness was the only significant predictor of academic

motivation. Similarly, Defeyter et al. (2012) found that conscientiousness has a significant positive effect on AM. They attribute this conclusion to the self-discipline and persistence often displayed by conscientious individuals. Payne, (2007) illustrated that conscientiousness can account for both intrinsic and extrinsic AM. Which corresponds with the present study as contentiousness could explain variance in in AM as a whole. The link between conscientiousness and AM found in this study is consistent throughout literature (Payne et al., 2007). Similar to the link with AP, the self-discipline and persistent nature of those who display high levels of conscientiousness reflects in a high AM (Payne et al., 2007). Conscientiousness and motivation were found to be closely related in Furnham, (2012) study. In the current study neuroticism, did not impact AM overall. Prior research indicates a negative correlation between neuroticism and AM (Payne et al, 2007). Komarraju & Karau, (2005) suggest that those who display high levels of neuroticism also score high in avoidance motivation (withdrawal from academic engagement) thus, a low AM. This finding was not present in the current study. While certain literature suggests that other PT are significant predictors of AM (Payne et al., 2007). No other personality trait proved to be a significant predictor of AM in the present study. Similarly, Noftle & Robins, (2007) suggest that agreeableness, extraversion and openness do not impact AM. Ultimately, the relationship between AM and all other variable remain complex. While certain research implies a correlation between all PT and AM, this correlation is not consistent throughout literature or found in this study.

The third hypothesis proposed that IQ will be a significant predictor of AM. While IQ can account for AP, IQ failed to significantly predict AM. Thus, hypothesis three is rejected. The incremental theory proposed by Dwek and Leggett, (1988) demonstrates the correlation between IQ and academic motivation. The theory suggests that those who believe their intelligence can be altered display a higher level of academic motivation. This theory holds

true throughout literature (De Castella & Byrne, 2015; Chen et al., 2018). Prior research has demonstrated that personality traits can predict AM and AP. In addition, the relationship between IQ and AP is well established. This implies that IQ may be able to predict AM. Although results proved to be contradictory. After investigating this claim, it was found that IQ does not play a role in academic motivation. A high IQ does not correlate with high levels of AM, nor does a low IQ result in poor AM. Thus, improving a student IQ will not result in a higher academic motivation. This finding implies that students who display a low IQ can still display high levels of AM. While IQ does not impact academic motivation, it is still important element in an educational setting due to its significant influence of academic performance.

Implications

The strongest predictors of academic performance have real life implications for both students who are doing well and those who are at risk of academic failure (Caprara, Vecchione, Alessandri & Barbaranelli, 2011). An individual's personality trait can alter their AP potential for instance, conscientiousness. As conscientiousness was found to be the strongest predictor of both AP and AM, educational setting should reinforce and promote persistence and self- discipline as these are facets highly linked to conscientiousness. Personality traits may be more suitable for intervention than cognitive variables (Stankov, Lee, Luo, & Hogan, 2012). Designing educational settings to prompt conscientious personality traits may increase AM and AP. Neuroticism was found to significantly promote high AP. Thus, certain facets within neuroticism may be beneficial. For example, eliminating stress altogether may be disadvantageous. The findings purpose that an optimal level of stress should be identified and maintained to achieve a high AP. Furthermore, the high self-efficacy concept within neuroticism should be promoted in students as it was found to reflect a high AP. IQ was significantly correlated with a high AP. Implications of this finding suggest that

those with a high fluid intelligence will display a high AP. Thus, ways to increase students IQ is of benefit to their overall AP.

Limitations

The study used a within groups design, while IQ and AP remains relatively constant throughout one's life, the personality trait and AM assessed in the study may have measured state-like structures, and differ at different time of an individual's life. Thus, a longitudinal study may have been a more accurate assessment. The current study used self-reported GPA to assess academic performance. Though self- reported AP has been found to be strongly related to the objective AP (Noftle & Robins, 2007), it may include inaccuracy due to memory errors or inflated estimates about one's pervious academic performance (Gramzow, Elliot, Asher & McGregor, 2003). The correlational nature of the study does not infer causal conclusions, therefore, the results obtained should be interpreted with caution. Furthermore, research was conducted in a small sample size, findings need to be replicated in larger samples. Abbreviated versions of both the ravens progress matrices and big five inventory were used, for time constrains and convenience. However, using short forms comes with limitations as it may alter reliability and validity of the original scale. The limitations presented within the current study lay the basis for future research.

Future recommendations

There is still much to be discovered in understanding predictors of AP and AM. The present study did not include every variable that my play a role in AM and AP. Future studies could extend these findings by including other variables that may predict academic performance and motivation, such as, self-efficacy and eustress (O'Sullivan, 2011). Future studies may be able to more accurately assess academic performance by obtaining participants actual exam results from college records as opposed to self-reported measures. This would ensure a more objective and accurate assessment of academic performance.

Furthermore, the hypothesis outlined in the current study could be investigated in an experimental design to be able to infer causation as opposed to just correlation. The impact of personality traits on AM and AP could be further investigated by assessing the facets within each personality trait to identify what exactly impacts AP and AM more closely. Furthermore, based of the findings of the current study an experimental study could investigate the results proposed within the study. For example, changing an educational environment to promote self-discipline and impulse control facets that are found within conscientiousness. Then obtaining AP and AM score prior and post experiment to examine if scores increase.

Conclusion

The current study contributes further knowledge to the understanding of AP and AM, by unraveling the impact of personality traits and intelligence. Conscientiousness is the strongest predictor of both AM and AP. It can be concluded that conscientiousness plays a stable and robust role in AP and AM. While intelligence can only predict AP. IQ determines what an individual can do, personality traits on the other hand, determine what an individual will do, and thus be a more accurate predictor of AM and AP (Furnham & Chamorro-Premuzic, 2004). Furthermore, neuroticism was found to play a positive role in AP but have no effect on AM. Although this finding was unexpected it has an important effect on educational psychology. Besides certain limitations presented, the research conducted interesting and practical findings. Considering their important real-life applications, the present results may provide a foundation for appropriate intervention to be put in place, to achieve one's academic potential. Thus, the current study offer ways to improve educational achievement. While the relationship between personality trait, intelligence, academic performance and motivation is still complex, the findings provided insight into this relationship.

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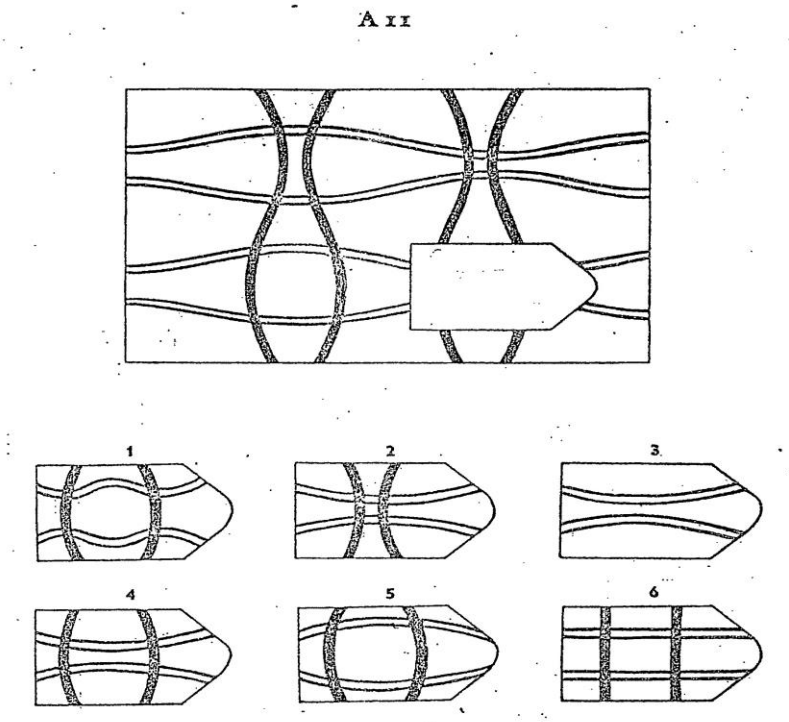
Appendix

Appendix A

Ravens standard progressive matrices: abbreviated 9-item short form:



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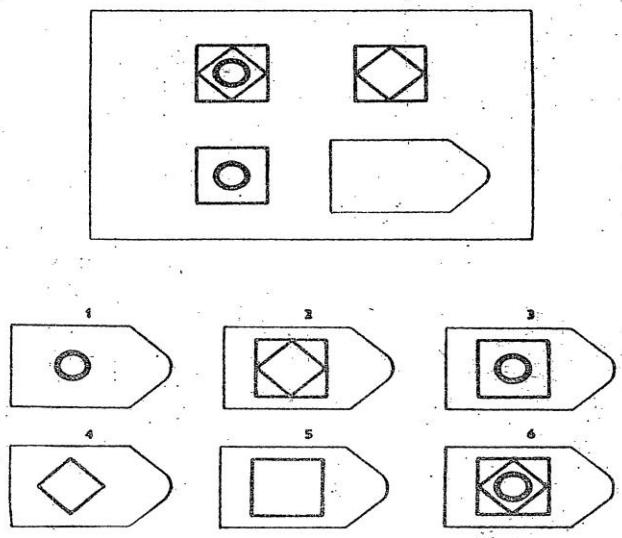

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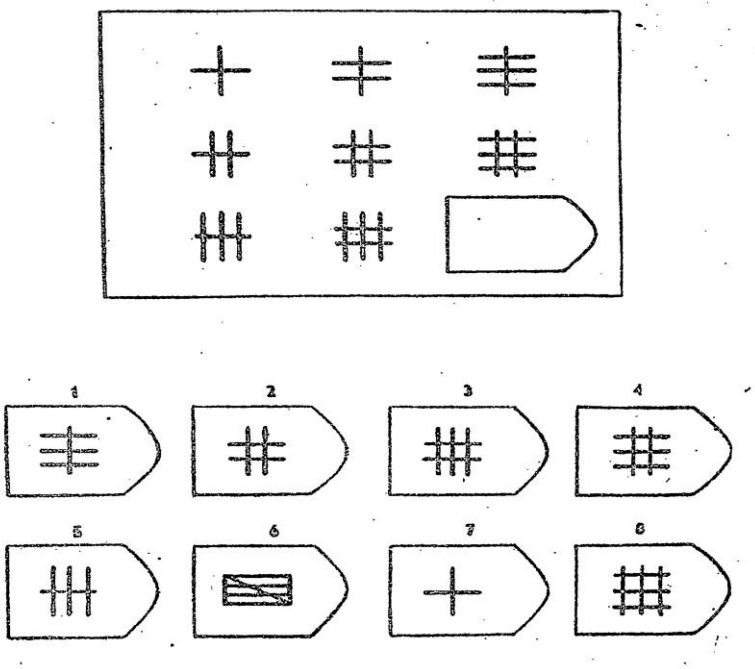

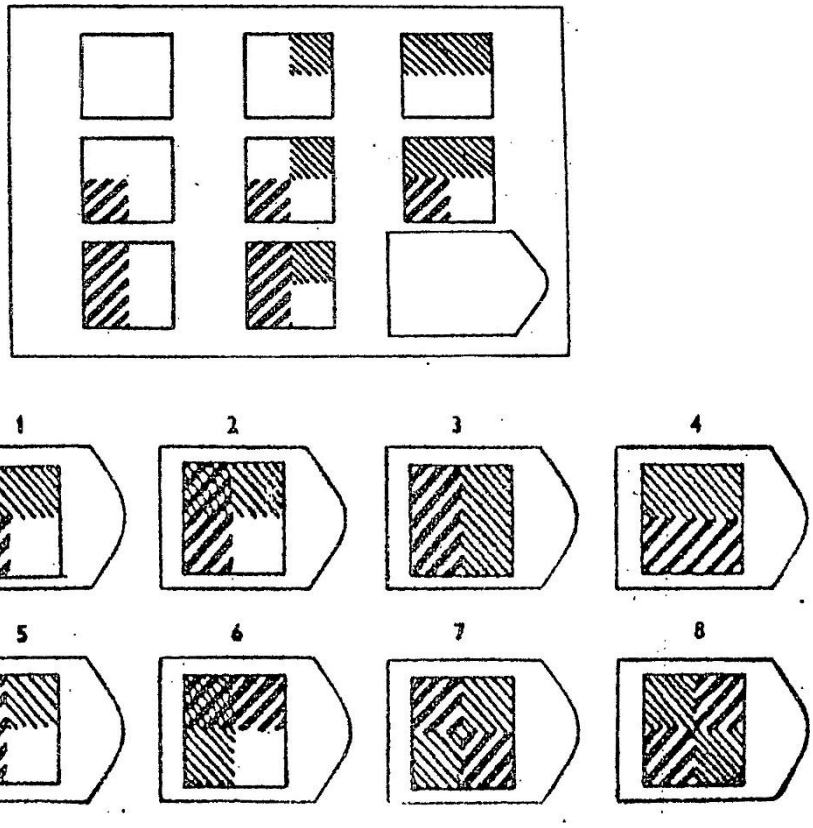
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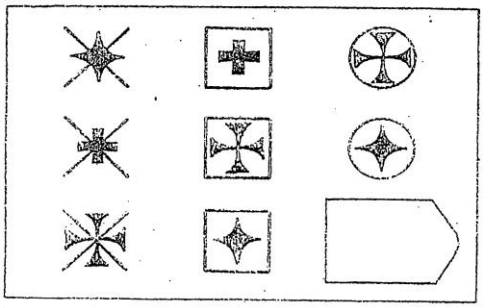

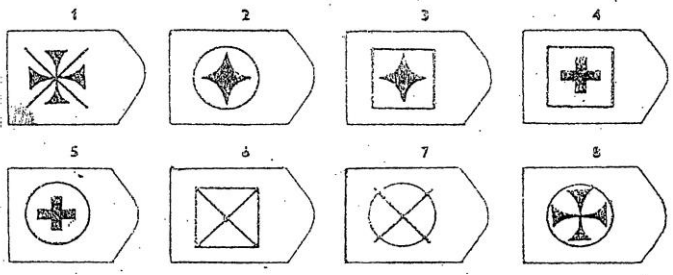

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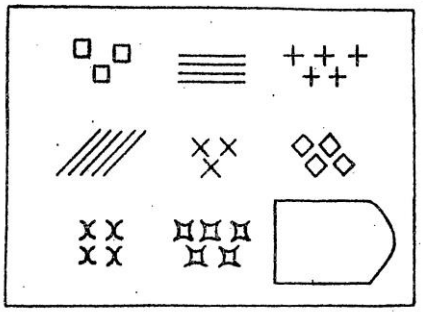

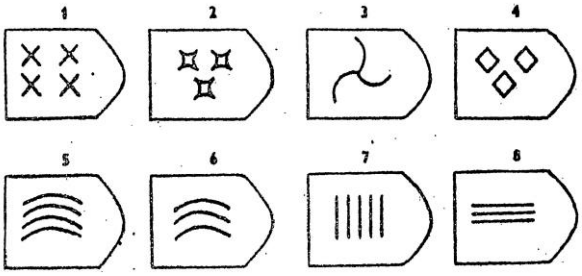

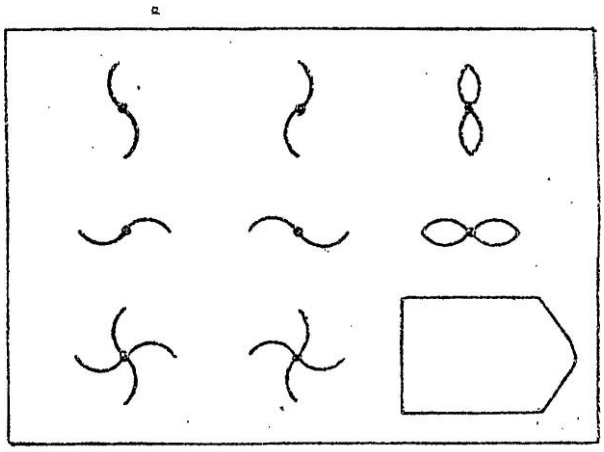

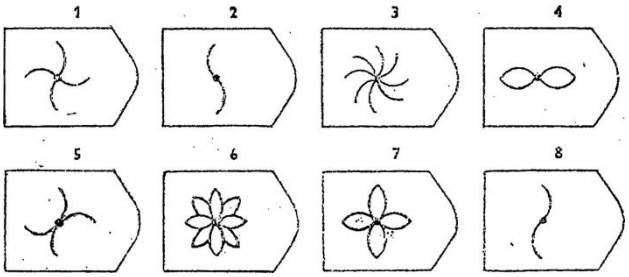

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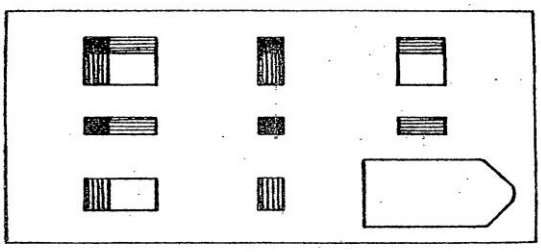

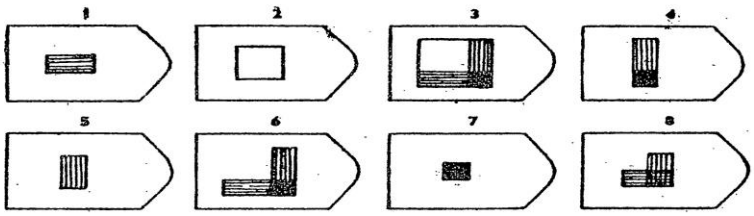

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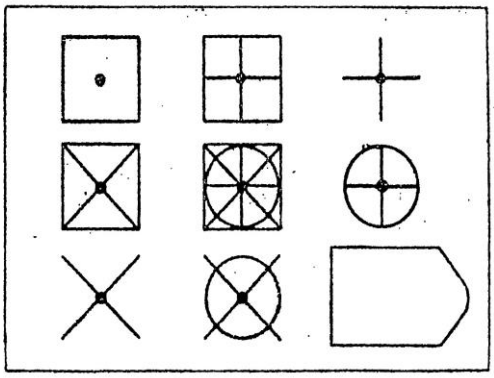
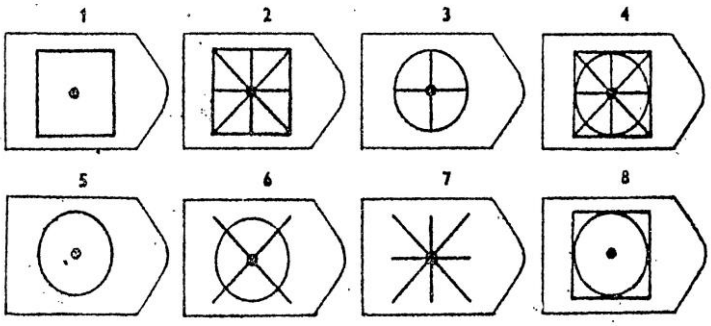




Appendix B

A Brief Version of the Big Five Personality Inventory.

Big Five Inventory-10 (BFI-10)

Adapted from Rammstedt, B. & John, O. P. (2007). Measuring personality in one minute or less: A 10 item short version of the Big Five Inventory in English and German. *Journal of Research in Personality, 41*, 203-212.

Instructions: How well do the following statements describe your personality?

I see myself as someone who ...

Response range from: disagree strongly, disagree a little, neither agree or disagree, agree a little, agree strongly

1. ... is reserved (1)
2. ... is generally trusting (1)
3. ... tends to be lazy (1)
4. ... is relaxed, handles stress well (1)
5. ... has few artistic interests (1)
6. ... is outgoing, sociable (1)
7. ... tends to find fault with others (1)
8. ... does a thorough job (1)
9. ... gets nervous easily (1)
10. ... has an active imagination (1)

Appendix C

ACADEMIC MOTIVATION SCALE (AMS-C 28)

Robert J. Vallerand, Luc G. Pelletier, Ma rc R. Blais, Nathalie M. Brière,

Caroline B. Senécal, Évelyne F. Vallières, 1992-1993

WHY DO YOU GO TO COLLEGE ?

Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you go to college.

WHY DO YOU GO TO COLLEGE ?

1. Because with only a high-school degree I would not

find a high-paying job later on. 1 2 3 4 5 6 7

2. Because I experience pleasure and satisfaction

while learning new things. 1 2 3 4 5 6 7

3. Because I think that a college education will help me

better prepare for the career I have chosen. 1 2 3 4 5 6 7

4. For the intense feelings I experience when I am

communicating my own ideas to others. 1 2 3 4 5 6 7

5. Honestly, I don't know; I really feel that I am wasting

my time in school. 1 2 3 4 5 6 7

6. For the pleasure I experience while surpassing

myself in my studies. 1 2 3 4 5 6 7

7. To prove to myself that I am capable of completing my

college degree. 1 2 3 4 5 6 7

8. In order to obtain a more prestigious job later on. 1 2 3 4 5 6 7

9. For the pleasure I experience when I discover

new things never seen before. 1 2 3 4 5 6 7

10. Because eventually it will enable me to enter the

job market in a field that I like. 1 2 3 4 5 6 7

11. For the pleasure that I experience when I read

interesting authors. 1 2 3 4 5 6 7

12. I once had good reasons for going to college;

however, now I wonder whether I should continue. 1 2 3 4 5 6 7

13. For the pleasure that I experience while I am surpassing

myself in one of my personal accomplishments. 1 2 3 4 5 6 7

14. Because of the fact that when I succeed in college

I feel important. 1 2 3 4 5 6 7

15. Because I want to have "the good life" later on. 1 2 3 4 5 6 7

16. For the pleasure that I experience in broadening my

knowledge about subjects which appeal to me. 1 2 3 4 5 6 7

17. Because this will help me make a better choice

regarding my career orientation. 1 2 3 4 5 6 7

18. For the pleasure that I experience when I feel completely

absorbed by what certain authors have written. 1 2 3 4 5 6 7

19. I can't see why I go to college and frankly,

I couldn't care less. 1 2 3 4 5 6 7

20. For the satisfaction I feel when I am in the process of

accomplishing difficult academic activities. 1 2 3 4 5 6 7

21. To show myself that I am an intelligent person. 1 2 3 4 5 6 7

22. In order to have a better salary later on. 1 2 3 4 5 6 7

23. Because my studies allow me to continue to learn about

many things that interest me. 1 2 3 4 5 6 7

24. Because I believe that a few additional years of

education will improve my competence as a worker. 1 2 3 4 5 6 7

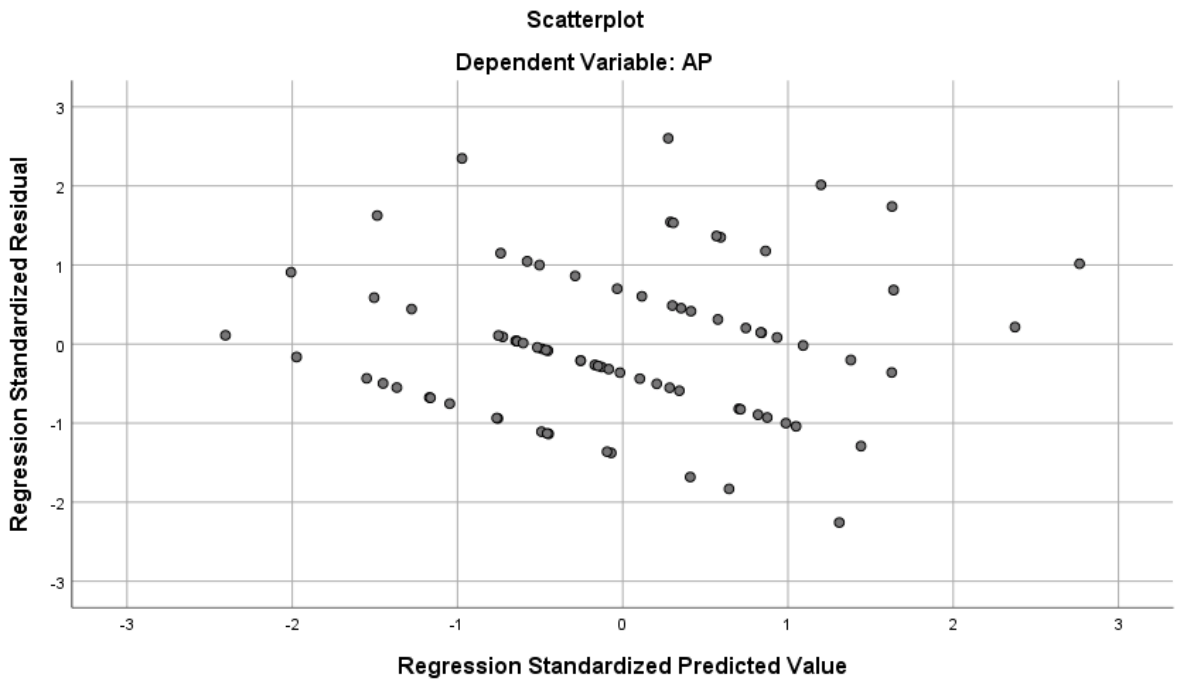
25. For the "high" feeling that I experience while reading about various interesting subjects. 1 2 3 4 5 6 7

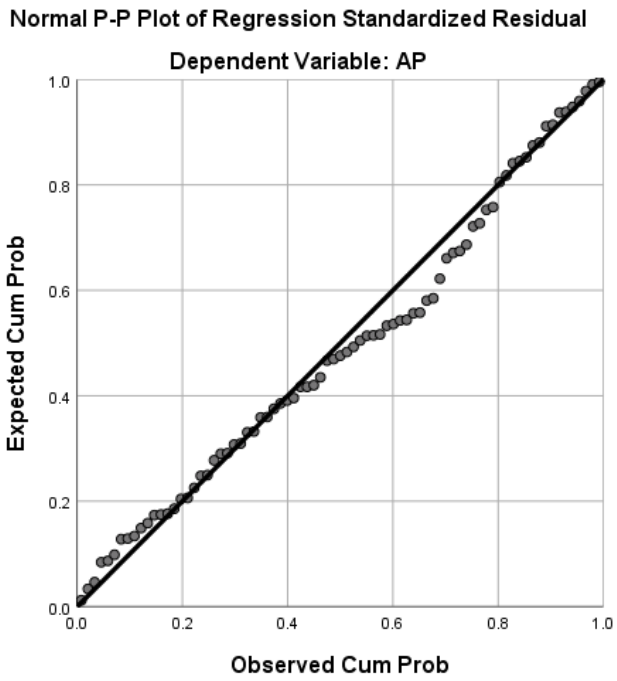
26. I don't know; I can't understand what I am doing in school. 1 2 3 4 5 6 7

27. Because college allows me to experience a personal satisfaction in my quest for excellence in my studies. 1 2 3 4 5 6 7

28. Because I want to show myself that I can succeed in my studies. 1 2 3 4 5 6 7

Appendix D: Mahalanobis Distance for academic Performance.





Appendix E: Mahalanobis Distance for academic motivation.