Scholastic Success: Fluid Intelligence, Personality, and Emotional Intelligence

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Abstract

The aim of the current study was to take examine the role of fluid intelligence, personality traits and emotional intelligence in predicting female Year 9 students Grade Point Average (GPA) and to determine whether any differences in scholastic performance were related to differences in Emotional Intelligence or Personality. Two-hundred and forty-three female secondary students who were enrolled in Year 9 (age: $M = 14.63$ years, $SD = 0.49$) completed the Adolescent Swinburne University Emotional Intelligence Test, Raven's Standard Progressive Matrices, and the Mini-IPIP and a GPA was calculated from the core subjects. The results revealed that higher GPA's were related to higher levels of Emotional Management and Control, Conscientiousness, and lower levels of Extraversion. The stepwise regression analysis revealed that variation in GPA was accounted for by IQ (21.8%), Conscientiousness, Extraversion, and Emotional Management and Control. It was concluded that the consistent predictive efficacy of EI skills in relation to scholastic outcomes, though modest in comparison to IQ, should be considered important, especially in the context of students achieving grades appropriate to their intellect across their schooling experience.

Scholastic Success: Fluid Intelligence, Personality, Emotional Intelligence and Learning Styles

Year 9 is considered the pivotal year in the determination of the relative success of students in their continuing education, and the decision whether to continue on with high school education (Black, 2004). Performance in this year of high school (when student's are aged 14-15 years) in Australia is particularly important, with performance in the core subjects contributing to students' ability to select subjects for their final years of secondary school study, and thus inform their University study and career prospects. Much of this decision is based upon the academic performance in the core subjects completed by students over the year, which can be further combined to produce a grade point average (GPA) for the year. The greater academic success as measured by GPA has been previously found to be associated with higher educational attainment (Lizzio, Wilson, & Simons, 2002), better employment outcomes (Hunter & Schmidt, 1996), and a range of life success and satisfaction measures (Suldo, Riley, & Shaffer, 2006). In comparison, lower GPA scores have been found to be associated with increased risk of suicide (Hacker, Suglia, Fried, Rappaport, & Cabral, 2006), unemployment (Bishop & Mane, 2004), clinical disorders (Shiner, Masten, & Roberts, 2003), and other less desirable life outcomes (Finn, Fish, & Scott, 2008). Given the importance of academic success in regards to the aforementioned life outcomes, research into the contributing predictors of academic success in adolescents is still necessary.

In the past 20 years, girls have been observed to outperform boys in regards to school based achievement (Hicks, Johnson, Iacono, & McGue, 2008; Steinmayr & Spinath, 2008), the antecedents of these differences most likely lies in psychological factors that differentially affect learning. Numerous variables have been identified as impacting on academic achievement including intelligence and personality (Chamorro-Premuzic & Furnham, 2003;

De Raad & Schouwenburg, 1996) and there is emerging interest in the role of Emotional Intelligence (EI) in academic achievement (Di Fabio & Palazzeschi, 2009; Newsome, Day, & Catano, 2000; Parker, Creque Sr et al., 2004; Petrides, Frederickson, & Furnham, 2004). The current study will examine EI as a predictor of final Year 9 results, whilst also examining the roles of intelligence and personality.

Extant research suggests that cognitive intelligence explains approximately 25% of the variance in academic achievement, making it the most important predictor of academic achievement (Harris, 1940; Neisser et al., 1996). Numerous studies have investigated the role of intelligence in predicting school achievement and the findings have been significant (Deary, Strand, Smith, & Fernandes, 2007; Di Fabio & Busoni, 2007; Furnham & Chamorro-Premuzic, 2004). Generally, intelligence correlates with years of education at about 0.55 (Neisser et al., 1996). The Standard Progressive Matrices (SPM; (De Lemos & Raven, 1989) and Advanced Progressive Matrices (APM; (Raven & Lewis, 1962) have been utilised in a number of studies as a measure of intelligence in predicting academic achievement (Colom & Flores-Mendoza, 2007; Di Fabio & Busoni, 2007; Di Fabio & Palazzeschi, 2009; Laidra, Pullmann, & Allik, 2007). The SPM conceptualises Spearman's '*g*' factor, measuring the ability to think clearly and make sense of complex information (Pind, Eyrun, & Johannesson, 2003; Raven, 1962). The SPM and APM have been found to predict academic achievement above socioeconomic status, parental intelligence, income and level of education (Colom & Flores-Mendoza, 2007). Other studies have found the SPM reliably predicts academic achievement while controlling for personality (Farsides & Woodfield, 2003; Furnham, Monsen, & Ahmetoglu, 2009). Whilst intelligence scores do predict a large amount of the variance associated with academic performance, girls commonly outperform boys in school based assessment despite no difference in cognitive intelligence being evident (Kuncel, Hezlett, & Ones, 2004).

The role of personality in predicting scholastic success in high school and university samples has been an area of keen interest (Furnham et al., 2009; Steinmayr & Spinath, 2008). Utilising the 5-factor model of personality (McCrae & John, 1992), the relationship between neuroticism, extraversion, openness, agreeableness and conscientiousness with scholastic success has provided important information concerning academic success in addition to the wide literature on the predictive efficacy of cognitive ability. By far the strongest and most consistent predictor of scholastic success in regards to personality is students' levels of conscientiousness (Busato, Prins, Elshout, & Hamaker, 2000). This positive relationship is generally attributed to organised, hard-working and motivated approach to study that more conscientious individual's display (De Raad & Schouwenburg, 1996).

The role of the other four personality dimensions is less clear in regards to their relationship with scholastic success (Poropat, 2009). Generally weak positive relationships between extraversion, openness to experience, and agreeableness have been observed with academic achievement along with weak negative correlations with neuroticism. In regards to sex differences, females generally score higher than males on neuroticism (McCrae & Terracciano, 2005). Males have been also found to score higher in extraversion, openness, and lower on measures of agreeableness (McCrae & Terracciano, 2005). How these differences in personality profiles affect learning, and scholastic performance in turn, at particular stages of education (in the case of the current study, year 9) is the focus of the current research in a cohort of female students. Of particular interest will be the relationship between these female students' self-reported levels of neuroticism and GPA, as higher levels of neuroticism are generally thought to be debilitative in respect to the lower levels of emotional stability of more neurotic individuals. This effect is thought to be particularly relevant under exam conditions, or conditions that induce stress or anxiety in less emotionally stable individuals (Bolger & Zuckerman, 1995). Neuroticism has been found to be negatively

related to GPA scores previously (Bauer & Liang, 2003), but in some studies, no significant relationship with academic performance has been observed (Halamandaris & Power, 1999).

Recently the role of students' Emotional Intelligence (EI) has garnered significant attention with respect to its role in predicting academic achievement (Agnoli et al., 2012; Di Fabio & Palazzeschi, 2009; Downey, Mountstephen, Lloyd, Hansen, & Stough, 2008; MacCann, Fogarty, Zeidner, & Roberts, 2011; Mavroveli & Sánchez-Ruiz, 2011). With a large amount of variation in academic achievement not accounted for by personality and IQ assessments, interest in the role of social and emotional factors such as EI have in predicting academic success has increased (Parker, Saklofsake, Wood & Collin, 2009). EI is considered to reflect aspects of social competence, whereby people's capacity to monitor their own and other people's feelings or emotions, to discriminate amongst emotions and emotional states and to use this information adaptively to guide thinking and behavior represent their self-reported ('trait') or 'ability' with regard to being Emotionally Intelligent. Both 'trait' and 'ability' conceptualizations of EI have demonstrated predictive efficacy with regard to academic performance in both primary and secondary education (Perez-Gonzalez, Cejudo-Prado & Duran-Arias, 2013; Billings, Lomas, Downey & Stough, 2013) with the effect of trait EI being attributed to aspects of emotional self-efficacy, and this effect observed to be more pronounced in lower cognitively able students (Petrides et al., 2004). The effect of ability EI has been ascribed to higher ability in emotional perception, management and understanding to facilitate the identification of emotional stressors and being able to adapt to stressful academic situations as a result of these higher competencies (Lyons & Schneider, 2005). Whilst the predictive efficacy of EI measures has not been consistently observed in the literature in regards to academic success (Parker, Hogan, Eastabrook, Oke, & Wood, 2006), both trait and ability measures have shown predictive efficacy in regards to individual

scholastic subjects and GPA (Barchard, 2003; Di Fabio & Palazzeschi, 2009; Downey et al., 2008; Peters, Kranzler, & Rossen, 2009).

With respect to some 'ability' based findings, in a sample of undergraduate psychology students, the emotional understanding subtests, Blends, Transitions and Analogies of the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) was found to be positively related to academic success as measured by GPA (Barchard, 2003). More recently, in an American school sample of students in grades 4-12, Peters, Kranzler and Rossen (2009) identified significant relationships between branches of MSCEIT- Youth Version and a series of scholastic performance criteria. Overall EI was associated with general intellectual ability, reading and math performance (Peters et al., 2009). In terms of the four branches, all but the Managing emotions branch were associated with the performance criteria. Perceiving emotions was associated with general intellectual ability and reading, Facilitating Emotions was associated with reading and Understanding Emotions was associated with general intellectual ability, reading and math marks (Peters et al., 2009), suggesting ability EI sub-tests or skills are differentially related to adolescent academic perfomance and general intellectual ability.

In regards to some 'trait' EI specific findings, Parker and colleagues have conducted a series of studies concerning the role of EI predicting scholastic success, and successful transition between high school and university (Parker, Summerfeldt, Hogan, & Majeski, 2004) using the Bar-On EQ-I inventory (Bar-on, 1997). They identified significant relationships between the intrapersonal, stress management and adaptability sub-scales with first year university GPA (Parker et al., 2004). They also observed that more academically successful students EI scores were significantly higher than less successful student's. Utilizing a similar statistical methodology, Downey, Mountstephen, Lloyd, Hansen and Stough (2008) compared EI to scholastic achievement in an Australian high school student

sample utilizing the Swinburne University Emotional Intelligence Test (SUEIT: Palmer &

Stough, 2001). This assessment is based upon the theoretical model of trait EI developed by

Palmer and Stough (2001) to assess EI in the workplace, which after administration to a large

sample of adolescent's was modified to provide a reliable and valid measure of EI in

adolescents (Luebbers, Downey & Stough, 2007). The adolescent SUEIT provides scores on

four factors of EI: Emotional Recognition and Expression (ERE; the ability to identify one's

own feelings and emotional states and the ability to express those inner feelings to others);

Understanding Emotions (UE; the ability to identify and understand the emotions of others);

Emotions Direct Cognition (EDC; the extent to which emotions and emotional knowledge are

incorporated in decision-making and/or problem solving); and Emotional Management and

Control (EMC; the ability to manage positive and negative emotions both within oneself and

others and control strong emotional states). In this previous study concerning the relationship

between EI and scholastic performance, the total EI score correlated positively with GPA,

geography and science marks (Downey et al., 2008), and again, more successful students

reported significantly higher EI scores. The EMC dimension was also found to predict a

significant proportion of Science and Math marks (Downey et al., 2008), two subjects that

form the basis of Year 9 GPA scores within the current sample.

With the development of EI measures specific to adolescents (Luebbers, Downey, &

Stough, 2007; Mayer, Salovey, & Caruso, 2005), an understanding how these measures

interact with, and predict variance in outcome measures such as GPA in addition to common

psychological variables is necessary. Given the observed overlap between personality and IQ

with scholastic success (Chamorro-Premuzic & Furnham, 2003; Neisser et al., 1996), and

recent studies illustrating that EI, measured in both 'trait' and 'ability' formats can predict

scholastic performance alone (Downey et al., 2008; Peters et al., 2009), and in addition to IQ

and personality (Di Fabio & Palazzeschi, 2009) the present study aimed to examine role of EI

in the prediction of scholastic achievement in conjunction with fluid intelligence and personality. Given that personality and IQ have already been found to be important predictors of academic achievement, the current study aims to investigate the incremental validity of EI in the prediction of GPA scores. It was hypothesised that EI would significantly contribute to the prediction of academic achievement above and beyond that of personality and IQ.

Method

Participants

The sample consisted of 243 female secondary students who were enrolled in Year 9 at a single high school in Victoria, Australia, with data being collected from three cohorts over the course of three years (2007 – 2009). Students ranged from 13 – 15 years of age; the mean age was 14.63 years (SD = 0.49).

Procedure

Participants were recruited from a Melbourne girl's college via information letters that were sent home to parents inviting their daughters to participate in a study concerning "The Roles of School Engagement and Emotional Intelligence in Academic Achievement". Both students and their parents' permission were sought via informed consent forms, and the project had been approved by Swinburne Universities Human Research Ethics Committee. Participants completed the Adolescent SUEIT, the mini-IPIP, and the Ravens Standard Progressive Matrices (SPM) during a double-period of class time. The administration of the tests was counterbalanced with alternate classes completing the SPM first then the questionnaire measures.

Measures

The Adolescent SUEIT (Luebbers et al., 2007) is a modification of the SUEIT (Palmer & Stough, 2001). The modification occurred in a two-stage process. First, the SUEIT was presented to a small sample of adolescents to assess the verbal accessibility of the items, such that rewording of ''problem'' items could be undertaken. Following these qualitative changes, the adolescent modified version of the SUEIT was administered to a larger sample of adolescents (N=1002) to gather information on internal reliability, and to perform validity testing via exploratory factor analysis. The Adolescent SUEIT is a self-report questionnaire made up of 57 items, which correspond to four subscales: Emotional Recognition and

Expression (10 items), Understanding Emotions (19 items), Emotions Direct Cognition (10 items) and Emotional Management and Control (18 items). Participants use a 5-point Likert-type scale, ranging from 1 for ''very seldom'' to 5 being ''very often'' to indicate how they typically feel, think and act.

Raven's Standard Progressive Matrices (SPM: (Raven, 2000) was designed to measure a person's ability to form perceptual relations and to reason by analogy independent of language and formal schooling, and may be used with persons ranging in age from 6 years to adult. The SPM consists of 60 items arranged in five sets (A, B, C, D, & E) of 12 items each. Each item contains a figure with a missing piece. Below the figure are either six (sets A & B) or eight (sets C through E) alternative pieces to complete the figure, only one of which is correct. Concurrent validity coefficients between the SPM and the Stanford-Binet and Weschler scales range between 0.54 and 0.88, with the majority between 0.70 and 0.80 (Raven, 2000).

The Mini-IPIP is a 20-item scale, with four items measuring each of the five-factor model of personality traits: namely extraversion, neuroticism, agreeableness, conscientiousness and openness to experience (Donnellan, Oswald, Baird, & Lucas, 2006). Each item is a phrase describing behaviour (e.g., '*Am the life of the party*'), and participants are instructed to indicate how accurate this phrase is for them, using a 5-point Likert-type scale. Scores for individual items from each scale were summed to produce a total score for each of the five scales. The Mini-IPIP has shown acceptable reliability and showed similar patterns of relationships with the longer IPIP (IPIP-FFM, 50 items) when correlating the measure with facets of the FFM and other relevant personality measures (Donnellan et al., 2006), as well as a replicable factor structure (Cooper, Smillie, & Corr, 2010).

Students GPA was calculated from an average derived from the Year 9 core subjects of: English, Maths, Religious Education, Science, Physical Education and Health taken across the entire school year. The range of scores that could be attained for this measure was 0 – 10.

Results

The means (M) and standard deviations (SD) for the EI, IQ, Personality, and GPA measures appear below in Table 1 along with the results of a correlational analysis. The mean scores for the EI dimensions are similar to those previously reported (Downey et al., 2008), although the scores for the Emotional Management and Control dimension are noticeably higher than reported in the development study (Luebbers et al., 2007). No normative data exists for the mini-IPIP, but the scores for the five dimensions were reliable in this sample, and of a comparable magnitude to those reported by Cooper and colleagues (Cooper et al., 2010).

Correlations between the GPA and EI, IQ and personality measures appear in Table 1. As expected, fluid intelligence as measured by the ravens was most highly correlated with Year 9 GPA (r=.46, p<.001). Of the EI dimensions, Emotional Management and Control was significantly correlated with academic success (r=.24, $p < 0.001$). Consistent with the findings of (Poropat, 2009), of the personality dimensions extraversion and conscientiousness showed the highest correlations with GPA ($r = 0.23$, $p < 0.001$ and $r = 0.22$, $p < 0.001$ respectively). Agreeableness was also found to be associated with academic achievement ($r = 0.15$, $p < 0.05$).

To assess whether EI would significantly contribute to the prediction of academic achievement in comparison to personality and IQ, a stepwise multiple regression was conducted with GPA as the dependent variable and IQ, EI and personality dimensions as the

predictor variables. Regression analyses identified five significant predictors, with IQ scores accounting for 21.8% variance in GPA, and Conscientiousness, Extraversion, and Emotional Management and Control also predicting additional significant amounts of variation in GPA scores (see Table 2).

Discussion

The present study sought to examine the role of fluid intelligence, personality, and emotional intelligence in the prediction of academic success in a sample of female secondary students. Assessment of ratings of personality and emotional intelligence across different academic levels revealed that academic success was related to higher levels of Emotional Management and Control, Conscientiousness, and lower levels of Extraversion. This finding is consistent with the extant results (Barchard, 2003; Di Fabio & Palazzeschi, 2009; Downey et al., 2008; Peters et al., 2009) that have reported positive findings concerning the role of EI in scholastic environments.

That the EI competency, Emotional Management and Control was found to be an important predictor of academic success, confirms the importance of this competency given its previously identified relationship with academic success in a sample of Australian adolescents (Downey et al., 2008). Further to this, in the regression analyses, Emotional Management and Control was observed to predict a significant amount of variance in GPA after IQ and the Personality dimensions were considered. As expected, the strongest observed relationship with GPA was with IQ scores and explained over 20% of the variance in GPA scores (Neisser et al., 1996). Differences in ratings of Extraversion and Conscientiousness were also evident between the academic groups, with the lower achieving students reporting lesser Conscientiousness and higher levels of Extraversion. Interestingly, Conscientiousness and Openness scores were the most predictive personality dimensions in the regression

analyses relating to GPA scores, with Extraversion scores not predicting a significant amount of variation in GPA.

The personality dimension Conscientiousness was found to predict variation in GPA scores in addition to the majority that was predicted by IQ scores. Differences between higher and lesser achieving students were also evident upon Conscientiousness scores as expected. Given the previously identified relationship between conscientious behavior and scholastic success, this result was as expected, along with the predominance of predictive efficacy of IQ (Neisser et al., 1996). Utilisation of better learning strategies has been previously associated with both aspects of both conscientiousness (Duff et al., 2004), with these approaches to learning possibly contributing to greater scholastic success in comparison to lesser achieving Year 9 female students in the current study. This suggests that within this important cohort, that reinforcement of an organised, hard-working and motivated approach to study will benefit scholastic outcomes in addition to intellectual prowess.

The Emotional Management and Control dimension was found to differ between the higher and lesser achieving students, and predicted a significant amount of variance in GPA. Greater emotional management and control has previously been linked to better identification of emotional stressors and being able to adapt to stressful academic situations (Lyons & Schneider, 2005; Parker et al., 2004).The advantage of higher IQ, better study habits driven conscientious approaches to studying may be augmented by the student's ability to understand what emotions they are experiencing, and to be able to harness positive emotions or manage negative emotions in common scholastic environments such as exams. In the case of exams, all the advantage of greater intellectual capacity and good quality study can be lost if a student is overwhelmed by exam conditions, or unaware of the emotional experience of written or verbal examination. Given the importance of Year 9 for determining the relative success of students in their continuing education, and what subjects they will be able to

undertake in their future studies, consideration of the EI abilities of students during this pivotal year (if not before) and therefore their ability to perform at the expected level during all forms of examination and learning activities should be an additional focus of educators.

The results of the current study indicate that the EI dimension, Emotional Management and Control did predict additional variance in GPA after consideration of IQ and significantly related personality dimensions. The incremental variance explained by the EI variable was only modest, but consistent with currently published research across high school students (Agnoli et al., 2012; Di Fabio & Palazzeschi, 2009; Downey et al., 2008; Parker et al., 2004; Peters et al., 2009; Qualter, Gardner, Pope, Hutchinson, & Whiteley, 2012). Additionally, the study population was made up exclusively of Year 9 female students from the same school over three years, possibly limiting the generalizability of the results to male, or age disparate groups. Future studies concerning the ability of EI measures to predict scholastic success over IQ and personality could consider utilizing EI scores from certain years (Year 9 for example) to predict scholastic achievement in years beyond the initial sampling (Qualter et al., 2012) in longitudinal studies in order to establish whether any moderating of predictive effect of EI scores exist over the course of high school education. This information could then be used to inform educators of the impact EI scores have upon the scholastic achievement of students, and possibly used to identify relative shortfalls in predicted student performance academically.

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Table 1

Descriptive statistics and correlations among Grade Point Average, Ravens Standard Progressive Matrices, Emotional Intelligence and Personality factors.

Variable	Descriptives		Correlations									
	M	*SD*	GPA	Ravens	ERE	UEO	EDC	EMC	Extrav	Agree	Consc	Neuro
Grade Point Average	7.24	1.27	-									
Ravens	47.77	5.52	.46**	-								
ERE	32.37	5.84	.05	-.05	-							
UEO	70.30	8.84	.06	.08	.36**	-						
EDC	31.55	5.19	-.04	-.00	.32**	.24**	-					
EMC	54.97	9.23	.25**	.18**	.34**	.44**	.10	-				
Extraversion	14.11	3.58	.23**	-.21**	.37**	.25**	.19**	.15*	-			
Agreeableness	16.23	2.68	.16*	.12	.28**	.43**	.19**	.31**	.29**	-		
Conscientiousness	12.20	3.61	.22**	.04	.26**	.19**	.06	.34**	.01	.13*	-	
Neuroticism	11.21	2.74	-.07	-.10	-.20**	-.17**	-.05	-.48**	-.14	-.18**	-.06	-
Openness	14.91	3.19	.02	.22**	.09	.31**	.18**	.31**	.17**	.19**	.01	-.24**

Note. N = 249-278, GPA = Grade Point Average; ERE = Emotional Recognition and Expression; UEO = Understanding the Emotions of Others; EDC = Emotions Direct Cognition; EMC = Emotional Management and Control; Extrav = Extraversion; Agree = Agreeableness; Consc = Conscientiousness; Neuro = Neuroticism; Open = Openness to Experience; *p < .05, ** < p.001

Table 2: Stepwise Regression of Academic Achievement IQ, Personality Factors, and EI

Step		Beta	t	R^2 change
1	Total Ravens Score	.467	8.21**	21.84
2	Total Ravens Score	.456	8.17**	3.81
	Conscientiousness	.196	3.51**	
3	Total Ravens Score	.425	7.50**	1.81
	Conscientiousness	.200	3.62**	
	Extraversion	-.138	-2.44*	
4	Total Ravens Score	.397	6.93**	1.68
	Conscientiousness	.147	2.50*	
	Extraversion	-.166	-2.90**	
	Emotional Management and Control	.145	2.38*	

Note: * $p < 0.05$; ** $p < 0.01$; R^2 change = % variance.