Cognitive Ability, Emotional Intelligence, and Their Impact on Academic Performance

by

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Abstract

Studies have modeled academic performance with variables such as motivation, personality, and learning strategies. No previous study, however, has considered the impact of emotional intelligence (EI), in addition to cognitive ability, on one model of academic performance. The research questions examined the relationship between EI and academic performance and cognitive ability and academic performance. The theoretical framework for this study was Mayer, Salovey, and Caruso's theory of emotional intelligence. Linear regression and correlation analyses were utilized to examine EI and cognitive ability to academic performance among a sample of 160 college students who completed the Self Report Emotional Intelligence Test (SSEIT) survey. Results demonstrated that cognitive ability is a significant predictor of academic performance, a finding that supports the results of previous studies. The resulting model provides teachers and students with a better understanding of the relationship between one's EI and one's ability to perform academically.

Keywords: academic performance, emotional intelligence, cognitive ability

Introduction

Intelligence testing began in the early part of the 20th century when psychologists first attempted to explain the observed variability in the academic performance of schoolchildren. It was initially assumed that intelligence, or the cognitive process responsible for judging and problem solving, was the sole predictor of academic performance (Dennis et al., 2005). While Binet and Simon (as cited in Boake, 2002) were the first to publish an intelligence scale in 1905, tests for the assessment of cognitive and perceptual abilities were in use in the mid-1800s for training cognitively impaired children (Boake, 2002). Additionally, the digit span and the substitution test were also used prior to the publication of the first Binet-Simon intelligence scale (Boake, 2002). Since then, numerous variables have been tested in an attempt to more fully understand how academic performance can be predicted. These variables include personality (Poropa, 2009), demographic characteristics (Dennis et al., 2005), motivation (Robbins et al., 2004, 2006), and self-regulating learning strategies (Pintrich, 2004; Wolters, 2003). While the magnitude of the predictive ability of each of these variables differs, each has been recognized by their associated researchers as valid predictors of academic performance (Poropa, 2009). In addition to the

variables noted, emotional intelligence (EI) has been used as a predictor variable of academic performance (Petrides et al., 2004). Considerable support has also been given to the notion that academic performance is related to noncognitive constructs such as a student's social and emotional adjustment to the school environment, which can be seen as a hallmark of high EI (Kyllonen., 2014; Zeidner., 2009).

In this study, a model of academic performance was developed that builds on previous literature by analyzing relationships of EI and cognitive ability to academic performance. This model explains additional variance in academic performance that was missed in previous, more parsimonious, models.

Academic performance is one of the most studied variables in education (Poropat, 2009) as one of the main goals of teaching is to bring the best out of students, which is usually defined as achieving as high of a grade point average or standardized test performance as possible. Thus, researchers have produced numerous studies using academic performance as the dependent variable. These studies include independent variables that range from cognitive ability and motivation (Robbins et al., 2006) to individual treatment of EI (Suliman, 2010) and thinking styles (Zhang, 2004). Demographic variables have also been tested extensively with respect to academic

performance (Dennis et al., 2005). This present study focused on two independent variables (cognitive ability and EI) together with demographic factors in a model to explain the variance in academic performance.

When taken in the general context, cognitive ability usually refers to the higher-level thinking of which humans are capable (Fray & Detterman, 2004). More specifically, cognitive ability refers to how humans process information, including how individuals perceive things, conceptualize them, and how problems are generally resolved. The phrase is often used interchangeably with the word intelligence. In the context of academic performance, cognitive ability is usually defined as the ability of individual students to perform on standardized tests such as the general Student Aptitude Test (SAT) or the subject-specific SAT IIs. Frey and Detterman (2004) measured the relationship between general cognitive ability and the SAT test and found a correlation of 0.89 between the scores of the Vocational Aptitude Battery and the SAT scores of the participants in the longitudinal survey. As a result, this study used the general SAT score results as a close proxy for cognitive ability.

The founders of the modern theory of EI are Mayer et al. (1999), though EI itself, as a term, can be found in Leuner (1966) and

Greenspan (1989). According to Petrides et al. (2004), the distal roots of EI can be traced back to the concept of social intelligence formulated by Thorndike in 1920 to refer to the capacity to "understand and manage people and to act wisely in human relations" (p. 277). EI's proximal roots can be found in Gardner (1983) who claimed that multiple kinds of intelligences can be divided into two main groups: intrapersonal and interpersonal intelligence (Petrides et al., 2004). The standard definition of EI is the ability to assess, identify, and control one's own emotions and also assess and identify the emotions of others and groups. The two categories of emotional intelligence are trait and ability. Ability EI has strong relationships to traditional intelligence and is typically measured using maximum performance tests, while trait EI is more strongly related to personality and is measured using self-report questionnaires. For this study, Schutte et al.'s (1998) 33-item questionnaire, which measures three aspects of emotional intelligence, was used. Schutte's Self Report Emotional Intelligence Test (SSEIT) measures appraisal and expression of emotion, regulation of emotion, and utilization of emotion; this test was used by studies such as Austin et al. (2004). While the instrument has a high internal consistency reliability (r = 0.90), it may lack discriminant validity and "appears to be unrelated to general intelligence" (Arora et al., 2010).

The Study

In this study, a quantitative correlational research design to develop an improved model of academic performance was used. Previous research, as noted in the brief background section, included academic performance models that related cognitive thinking and EI individually to academic performance; however, a single model using both these factors has not been previously tested. As a result, this research study employed the nonexperimental correlational method using a stepwise multiple linear regression to specify the model of academic performance. The method of quantitative research is consistent with existing studies that have explored correlates of academic performance. While the goal of the study was to develop the improved model of academic performance, the primary focus was to explore the ability of EI and emotional intelligence to predict academic performance.

Literature Review

Cognitive Ability and Academic Achievement

The assertion that predicting school performance requires the consideration of both cognitive and personality variables has been

supported by other scholars who share the claim that neither one, taken in isolation, is sufficient to predict academic success (Chamorro-Premuzic & Furnham, 2006; Rindermann & Neubauer, 2001; Rothstein et al., 1994).

Laidra et al. (2007) found that intelligence and personality are both predictive factors of academic success. However, even in combination, they cannot explain more than around 30% of the total variance in GPA. Still, consistent with earlier works on the topic, intelligence remains the best single predictor of academic achievement, and is applicable to all grade levels.

The magnitude of the correlation testing between intelligence and academic achievement is a reliable tool for assessing the teacher and the school, as well as the scholastic performance of students (Naglieri & Bornstein, 2003). Laidra et al. (2007) stated in their study that the difference between GPA and intelligence was also found at r = 0.5. What was different in their study was that they tried to correct for restriction of range for Raven's Standard Progressive Matrices (SPM), which is a "measure of pure non-verbal reasoning ability that is relatively independent of specific learning acquired in a particular cultural or educational context" (Laidra et al., 2007, p. 444). With this, they observed that age related decrease in the magnitude of the

relationship between intelligence and academic achievement disappeared.

Naderi et al. (2010) designed a study to examine if a relationship between intelligence and academic achievement exists and if gender disparities can be observed in this probable relationship. The researchers found no relationship between intelligence and academic achievement. Moreover, this relationship can be applied to both male and female students. Rohde and Thompson (2007) claimed that while empirical evidence would show that there is a strong link between general cognitive ability and academic achievement, general intelligence only explains up to 50% of academic achievement variance (Krumm et al., 2008). Luo et al.'s (2003) study showed that items of intelligence such as mental speed component, along with other substances, can be an intervening factor in the relationship between intelligence and academic achievement.

Watkins et al. (2007) posited whether intelligence and academic achievement can really be treated as separate constructs and if intelligence and achievement have reciprocal effects on each other or intelligence can cause academic achievement (Watkins et al., 2007). According to Chamorro-Premuzic and Furnham (2005), both intelligence and personality should be considered when predicting

school performance. Neither one on its own is enough to predict school outcomes or academic achievement.

Duckworth et al. (2012) proposed that standardized achievement test scores are more useful and accurate for assessing competencies determined by intelligence rather than self-control. On the other hand, report card grades are more accurate in evaluating competencies established more by self-control rather than shaped by the students' intelligence. They claimed that intelligence is the factor that can assist student learning and improve problem-solving skills, notwithstanding the formal instruction received by the student. Duckworth and Seligman (2005) assessed the relationship between intelligence and academic achievement. They extended a previous longitudinal study of 140 eighth grade students assessing whether self-discipline can affect academic achievement. They found that between intelligence and self-discipline, the latter can explain more the variance in final grades. Self-discipline is twice as effective as IQ in explaining changes in final grades as well as changes in other academic-related factors such as high school selection, school attendance, hours spent completing assignments, hours spent viewing television, and the time of day students start doing their homework. Many studies showed that intelligence is closely linked to academic

achievement (Aluja-Fabregat & Blanch, 2004; Lounsbury et al., 2003; Rindermann & Neubauer, 2001). However, earlier studies showed that as students reach the upper grades, the effects of intelligence on academic achievement do not stay consistent. Compared to the effects of intelligence, the positive effects of conscientiousness and openness on academic achievement are more consistent (Paunonen & Ashton, 2001). According to Heaven and Ciarrochi (2012), few studies have shown the link between cognitive ability and personality among adolescents. They hypothesized that, with high cognitive ability, students can perform better at school, as long as they also have high openness and high intellect. Collier (2012) differentiated intelligence and intellect by saying that intellect denotes cognition or the rational mental processes that constitute knowing, while intelligence is a function of consciousness that goes beyond the facts to determine meaning or purpose and decide on the best course of action to be taken.

Emotional Intelligence and Academic Achievement

In recent years, there has been a gradual increase in research interest in determining the usefulness of emotional intelligence and emotions, especially in the workplace (Goleman, 1998, 2006; Riggio & Lee, 2007). Emotional intelligence is defined by

Mayer and Salovey (1997) as the "the ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge and to reflectively regulate emotions so as to promote emotional and intellectual growth" (p. 10). The study of emotional intelligence has produced various debates. According to some studies, females have higher emotional intelligence than males (Brackett et al., 2004). Other debates have centered on the nature of emotional intelligence and the best way emotional intelligence can be measured (Roberts et al., 2001). Brackett et al. (2004) maintained that the best way to measure emotional intelligence is through ability models. On the other hand, researchers such as Bar-On (1997) have posited that emotional intelligence can be best measured through mixed models. For them, emotional intelligence is having personality, motivation, and affective dispositions aside from having the ability to gauge emotions. Moreover, for those who view emotional intelligence as an ability, emotional intelligence has been measured more by using objective, maximal performance measures that illustrated emotional intelligence to be more of a type of intelligence than simply some concept of personality (Brackett & Mayer, 2003; Lopes et al., 2003; O'Connor & Little, 2003). On the other hand, those who view and measure emotional intelligence using the mixed models measure emotional

intelligence using self-report means, which illustrate that emotional intelligence is more of a personality trait, rather than a form of intelligence (Dawda & Hart, 2000; Saklofske et al., 2003, Van Der Zee et al., 2002).

Developing a Model

The purpose of this quantitative correlational study was to develop a model of academic performance that builds on the previous literature by analyzing the relationships between emotional intelligence (EI) and cognitive ability to academic performance. In doing so, two questions were posed:

RQ1: What is the relationship between EI and academic performance?

H1a: There is no statistically significant relationship between EI, as measured by Schutte Self Report Emotional Intelligence Test (SSEIT), and academic performance, as measured by GPA, in a stepwise multiple linear regression.

H1b: There is a statistically significant relationship between EI and academic performance in a stepwise multiple linear regression.

RQ2: What is the relationship between cognitive ability and academic performance?

H2a: There is no statistically significant relationship between cognitive ability, as measured by SAT scores and academic performance, as measured by GPA, in a stepwise multiple linear regression.

H2b: There is a statistically significant relationship between cognitive ability and academic performance in a stepwise multiple linear regression.

A quantitative correlational research design was utilized to examine the relationships between EI and cognitive ability to academic performance (Metwally, 2012). Multiple linear regression procedure was used to determine whether EI and cognitive ability were related to academic performance.

The target population for this study involved 159 college students from a regional college located in Northeast of the United States. Participants were asked to identify their gender, age, and ethnicity. The descriptive statistics of the responses were compared to the demographic profile of the university study body. Surveys were used to gather responses from participants and measure the variables

emotional intelligence and cognitive ability as measured by SAT scores and academic performance. The emotional intelligence score of participants was measured through Schutte et al.'s (1998) SSEIT 33-item questionnaire that is based on Salovey and Mayer (1990) model of EI. The variables of cognitive ability and academic performance were measured through the self-report of participants, while cognitive ability was measured using the self report of the Scholastic Assessment Test results of the participants. Academic performance was measured using the self-report of the GPA provided by the participants.

The first research question sought to determine the predictive ability of emotional intelligence on academic performance. This determination was based on the results of a linear regression analysis, as summarized in Table 1. The results indicate that EI is not a statistically significant predictor of academic performance (β = -.002, p = .472). The model wherein EI predicts academic performance was also found to not be statistically significant ($F_{(1, 158)}$ = .520, p = .472). Therefore, the second null hypothesis, which stated, "There is no statistically significant relationship between EI and academic performance in a stepwise multiple linear regression," is not rejected.

Table 1

Results of Linear Regression Analysis (Emotional Intelligence as Predictor Variable)

Model		Unstandardized coefficients B	Std. error	Standardized coefficients Beta	t	Sig
1	(Constant)	3.256	.325		10.005	.000
	Emotional intelligence	-.002	.003	-.057	-.721	.472

a. Dependent variable: academic performance
b. $F(1) = .520$, $p = .472$, adjusted $R^2 = -.003$

The second research question sought to determine the relationship between cognitive ability and academic performance in a stepwise multiple linear regression. Based on the results of the linear regression analysis conducted to resolve this research question, cognitive ability is a significant predictor of academic performance ($\beta = .267$, $p = .003$). The results also indicate that the proposed model, where cognitive ability predicts academic performance is statistically significant ($F(1, 158) = 12.083$, $p = .001$). The adjusted R^2 value indicates that cognitive ability accounts for 6.5% of the variance in academic performance (adjusted $R^2 = .065$). These results indicate that the third null hypothesis, which stated, "There is not a statistically significant relationship between cognitive ability and academic performance in a stepwise multiple linear regression," is rejected and the third alternate hypothesis is validated. The results of the study are summarized in Table 2:

Table 2

Results of Linear Regression Analysis (Cognitive Ability as Predictor Variable)

Model		Unstandardized coefficients		Standardized coefficients Beta	t	Sig
		B	Std. error			
1	(Constant)	2.402	.182		13.169	.000
	Cognitive ability	.001	.000	.267	3.476	.001

a. Dependent variable: academic performance

b. $F(1) = 12.083$, $p = .001$, adjusted $R^2 = -.065$

Discussion

The purpose of this quantitative correlational study was to develop a model of academic performance that builds on previous literature by analyzing the relationships between emotional intelligence (EI) and cognitive ability with academic performance. The results of the analyses indicated that between emotional intelligence and cognitive ability, only cognitive ability was a statistically significant predictor of academic performance, accounting for 6.5% of the variance in academic performance.

The level of significance and strong relationship of EI to academic performance has led scholars to consider EI as a practical form of intelligence, particularly in the field of organizational leadership (Riggio & Lee, 2007; Sternberg, 1985; Zacarro, 2002). An individual with high EI typically has a strong social network (Ciarrochi et al., 2001), positive interactions (Lopes et al., 2003), positive behavior (Schutte et al., 1998), improved perceptive and appraising ability (Salovey et al., 2000),

and the ability to solve complex problems (Heppner & Lee, 2002). In sum, there is evidence that suggests that EI and success in life endeavors are significantly related. However, in this study, the results of the stepwise linear regression showed that the model wherein EI is a predictor of academic performance is not statistically significant. In addition, scores for the EI variable did not predict the scores for Academic Performance. This means that while EI is considered essential in workplace and social performances of an individual, its relevance in the academic activities has been refuted in this present study.

Studies have shown that cognitive abilities of students determine their academic performance (Farsides & Woodfield, 2003; Rindermann & Neubauer, 2001) and that intelligence remains the strong predictor of students' success in the academe (Naglieri & Bornstein, 2003). As strong correlations have been reported over the past decades, the present study verified that cognitive ability predicts academic performance. Results of the study confirmed that cognitive ability is a significant predictor of academic performance. In this model, the predictive value indicates that cognitive ability accounts for 6.5% of the variance in academic performance. In light of how various studies have linked cognitive ability with academic performance, this value denotes that cognitive ability only accounts for a small portion of the variance in academic performance. In the case of this study, this may be attributed to recall bias that may have been in effect when people were asked to report their SAT and GPA scores. No new insight was gained on the SAT and its ability to predict GPA; this was only mentioned in order to establish the

validity of using GPA as a proxy for intelligence in the absence of SAT scores, which has

been found to correlate to intelligence.

Summary

Academic performance is one of the most studied variables in the field of

education (Poropa, 2009). For educators, there is an increased emphasis on helping

students to achieve the highest standardized test scores possible. With this goal,

educational scholars have conducted numerous studies about the factors that affect

academic performance, ranging from demographic variables (Dennis et al., 2005),

cognitive ability, and motivation (Robbins et al., 2006) to individual treatment of EI

(Suliman, 2010). The purpose of this quantitative correlational study was to develop a

model of academic performance that builds on previous literature by analyzing the

relationships between emotional intelligence (EI) and cognitive ability with academic

performance. The results of the analyses indicated that between emotional intelligence

and cognitive ability, only cognitive ability was a statistically significant predictor of

academic performance, accounting for 6.5% of the variance in academic performance.

Limitations

This study is bound by several limitations. Because the researcher

implemented a convenience sampling strategy, the sample of the study is not

representative of the population. The use of a random sampling strategy is recommended

to generate a sample that is more representative of the study population (Acharya et al.,

2013). Furthermore, based on the sample generated for this study, the proportion of male to female respondents is skewed, which may not be representative of the population. In addition, given that data were collected based on self-report measures, participants may not have completed the instruments as truthfully as desired in an academic study, and the participants' recollection of their SAT scores and GPA might not have been accurate.

Suggestions for Future Research

It is recommended that future researchers replicate this study using randomly selected sample. In doing so, data on academic performance and cognitive ability should be collected from archival records to ensure accuracy. Since the focus on this study was only on the correlative relationship between the variables, future researchers should conduct a study where the focus is on the causal relationship between the variables. The issues identified about the distribution of the participants in terms of their age and gender should be addressed by recruiting a more representative sample of the population. Similarly, quantifying the Cognitive Ability variable based on SAT scores could be revised to using percentage of final score out of the highest possible score. This would address the inconsistency brought about by the 2005 adjustment in the highest possible score of the SATs from 1600 to 2400.

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