

Intelligence and Self-Control Predict Academic Performance of Gifted and Non-gifted Students

Zekâ ve Öz-Kontrol 'un Üstün Zekâlı ve Normal Öğrencilerin Akademik Performansları ile Olan İlişkisi

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Abstract

The role of intelligence and self-control on academic performance of academically gifted and non-gifted students was investigated. Intelligence was measured by the Cognitive Ability Test (CAT) which consisted of two subscales: verbal subtest and quantitative subtest. Self-control was assessed by observing the level of students' commitments to submit their assignments and homework timely. The sample consisted of 74 freshmen- male students. Academically gifted students were selected based on their academic performance as indicated by their GPA scores, the cut-off point was 3.50 out of 5.00. Intelligence and Self-control were entered a linear multiple regression model as independent variables whereas students' GPAs in the first semester was entered as the criterion variable. The results showed that both intelligence and self-control correlated significantly with GPA for the whole sample, $r(74) = .31$ and $.58$ respectively ($p < .01$). Intelligence and self-control did not correlate significantly with each other. The results also showed that for the whole sample both intelligence and self-control accounted for 42% of the variance in students GPAs. For the gifted sample, both intelligence and self-control explained around 59% of the variance in the GPAs.

Key Words: intelligence, self-control, giftedness, identification, academic performance

Öz

Bu çalışmada zekâ ve öz-kontrolün akademik olarak üstün zekâlı ve normal öğrencilerin akademik performanslarındaki rolü araştırılmıştır. Zekâ ölçümlerinde sözel ve sayısal olmak üzere iki alt testten oluşan Bilişsel Yetenek Testi (CAT) kullanılmıştır. Öz-kontrol ise öğrencilerin ödevlerini ve görevlerini zamanında yapma davranışları gözlemlenerek değerlendirilmiştir. Üniversiteye devam eden 74 erkek birinci sınıf öğrencisi araştırmanın katılımcılarını oluşturmaktadır. Not ortalamaları 5 üzerinden 3,5'ü geçen katılımcılar akademik üstün zekâlı olarak seçilmiştir. Zeka ve öz-kontrol puanları bağımsız değişken, ilk dönem not ortalaması ise kriter değişkeni olarak kullanılarak çoklu doğrusal regresyon modeli oluşturulmuştur. Bulgulara göre zeka ve öz-kontrol ile not ortalamaları arasında tüm örneklem için anlamlı bir ilişki bulunmuş [$r(74) = .31$ ve $.58$; $p < .01$], zeka ve öz-kontrol arasında ise anlamlı bir ilişki bulunmamıştır. Tüm örneklem için zekâ ve öz-kontrol notların %42'sini açıklarken, üstün zekâlı grupta bu oran %59 olarak bulunmuştur.

Anahtar Kelimeler: zekâ, öz-kontrol, üstün zekâ, tanılama, akademik performans

Introduction

Academically gifted students enjoy personal qualities beyond intelligence. Traditionally, academic performance has been linked to scores on intelligence tests (Sternberg & Kaufman,

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1998). Though intelligence is one of the most known predictors that determines students' performances in school, it is not the only one (ACT, 2007; Ceci, 1996; Ceci & Liker, 1986; Gannon & Ranzijn, 2005; Gardner, 1993; Neisser, 1976; Renzulli, 1986; Sternberg, 2003; Sternberg & Williams, 1998). Several personal qualities, including cognitive and non-cognitive competencies, are among essential factors connected to successful performance in various domains including academia (Ericsson, 1996; Grigorenko, Meier, Lipka, Mohatt, Yanez, & Sternberg, 2004; Sternberg & Ruzgis, 1994). In the journey of understanding successful human performance, scholars have studied personality using various approaches and revealed a number of important personal attributes that are associated with successful, intelligent, gifted, and creative behaviors. In this study, the author explores the role of two distinctive psychological constructs emerging from two schools of thoughts in explaining academic performance of gifted and non-gifted students: intelligence in psychometric approach and self-control from social-cognitive prospective.

Intelligence is a well-known construct that underlies academic performance. Historically, Binet and Simon developed the first test of intelligence, to objectively discriminate between those who perform well in school and those who do not (Guilford, 1967; Sternberg, 2003). Thus, the initial purpose of tests of intelligence is to identify students who fall behind in schools. Today, many admission authorities are using test of intelligence to qualify students for gifted education programs. Scores on Scholastic Aptitude Tests (SAT) or ACT Test are one of the important criteria that are being used to admit student into gifted programs (Shore, Cornell, Robinson, & Ward, 1991). In Saudi Arabia, for instance, scores of General Ability Test, similar to SAT, are prerequisite to admission into programs for the gifted and talented students. Indeed, you hear rarely an identification system for gifted students that does not include tests of intelligence as one of the most important criteria for students' selection system. Even though, the tests of intelligence are limited in its productivity power in explaining this phenomena, they are used in many admission authorities (Alsaif, 2004). Recently, King Abdullaziz and his Companions Foundation for Giftedness and Creativity (Mawhiba), the primary authority for the education for the gifted students, has appointed the National Center for Assessment in Higher Education (Qiyas) to develop intelligence tests that can be used for identification of gifted students.

Success is an optimal mixture of excellent personal competencies (Burger, 2004). The personal qualities include patterns of our thinking, feeling, and acting. Successful performance in academic domains is associated with enormous number of personal and contextual factors in addition to intelligence. Personal factors include cognitive and non-cognitive competencies such as memory, reasoning, analysis, motivation, emotion, self-efficacy, believes, self-concept, and self-control and so on. Even though most of intelligence tests are limited in the number of cognitive competencies they embrace, there is a great deal of evidence that intelligence scores predict performance with a medium precision level in academic domains. However, in other contexts such as workplace, social life, and health issues, other personality factors such as self-control, motivation, and emotion management predict performance better than intelligence

(Blanchard-Fields, Chen, & Norris, 1997; Burger, 2004; Carraher, Carraher, & Schliemann, 1985; Ceci, 1996; Ceci & Liker, 1986; Dai & Sternberg, 2004; Davidson & Sternberg, 2003; Gardner, 1999; Gottfredson, 2001; Jaušovec, 1997; Kohn & Schooler, 1983; Liff, 2003; Neisser, 1976; Renzulli, 1986; Sternberg, 1990).

The fact is that other personality attributes predict academic performance as good as intelligence or even better. For example, in his Three Rings theory, Renzulli argued that gifted behaviors reflect an interaction of three human attributes, above average ability, high level of task commitment, and high levels of creativity (Renzulli, 1986). A high level of task commitment is a type of self-control. Self-control is a distinctive psychological construct associated with academic success. Self-control, for instance, is a hypothetical construct that explains a great deal of human performance in various domains including academia. Self-control is “the ability to control one’s behavior and desires and delay gratification for later rewards” (Myers, 2010). According to Rotter (1966) people tend to behave in a certain way because of their expectation of the rewards (In: Burger, 2004). For example, students study hard because they expect to get high scores in a course. Thus, students make decisions whether to go or to withdraw based on their expectancies of rewards. Similarly, we rely on our general beliefs about our ability to influence situations. Students who believe that they can achieve well in schools tend to have high internal locus control orientation and persist to do well on schools’ tasks. On the other hand, students who think that the school is too hard, tend to be influenced by external locus control orientation and give up tasks easily. Thus, individuals’ perceptions, feelings, and beliefs about an issue tend to influence decisions and choices they make in daily life. Hence, how do gifted and non-gifted students differ on this construct? And to what extent does self-control explain high performance in academia in comparison to intelligence?

Academically gifted students, who perform highly well in school work, tend to perform well on tests of intelligence. Tests of intelligence were used as a major criterion in many educational authorities to qualify students for gifted programs, despite the fact that the predictability power of such tests in academic performance is moderate (Gottfredson, 2001; Grigorenko et al., 2004; Kaia, Helle, & Ju’ri, 2007; Sternberg, 1982; Sternberg & Grigorenko, 2002; Sternberg, Okagaki, & Jackson, 1990; Sternberg & Ruzgis, 1994). Further, admission offices to gifted programs place high weight to IQ scores criterion than other criteria because the quality of the psychometric properties of these tests. In doing so, these programs neglect some high quality students who are very motivated, self-disciplined, and self-controlled from these programs by preferring those who show high verbal and quantitative abilities. For example, in Saudi Arabia, the important or the definitive criterion in identification of highly potential students for gifted programs (e.g., summer programs, schools for gifted) is to have high scores on the General Ability Test (GAT). The GAT, like SAT and ACT, mainly test the verbal and quantitative abilities. Therefore, investigating the role of both intelligence and self-control would elucidate an important segment for gifted and successful performance in academic domains. Further-

more, taking into consideration the two distinctive factors that are associated with performance of academically gifted students would yield to more precision approach to identification of gifted students who with great confidence that they will make it through a very challenging program.

In the current study, the author argues that intelligence explains partially the performance of academically gifted and non-gifted students. Other personality factors such as self-control are associated with school performance. Furthermore, the two constructs, intelligence and self-control, are distinctive attributes of individuals, and when considering both aspects of a person, they together explain academic performance more than either one alone. Hence, the present study encloses a number of significant virtues that contributes to the body of knowledge in the field of the education for gifted students. First, the study examines the role of intelligence in comparison to self-control in academic performance. Second, the author explores the function of intelligence and self-control in academic performance of gifted and non-gifted students. Third, the study shows how much of academic performance is explained by intelligence and self-control. Finally, the author pinpoints how both constructs could be used by admission authorities to identify gifted students to minimize false positive selection for gifted programs.

Intelligence and Academic Performance

For more than a century, intelligence has dominated the field of psychometric testing as a unitary single construct that influences human's behaviors whereby an individual's superiority of performance in various talent fields is determined by the capacity of this construct (Sternberg, 2003). Early scholars in the field of intelligence contended that all human behaviors are underpinned by one psychological construct that is the "g" factor (Ceci & Liker, 1986; Sternberg, 2000, 2003; Sternberg & Detterman, 1979, 1986; Sternberg & Grigorenko, 2004a). References to this creed can be tracked back in the work of Spearman, Thurstone, Terman, and Cattell, just to list a few. This classical view of intelligence, as a "g" factor, has been criticized by previous and contemporary scholars and researchers from various schools of thoughts (cognitive, social, biological, contextual), affirming that intelligence unfolds in various contexts and the "g" factor does not articulate what intelligence is (Ceci, 1996; Sternberg, 1984; Sternberg & Grigorenko, 2003). Further, there is no consensus among scholars on what intelligence is. Despite these controversies, the psychometric approach covers a plethora of tests of intelligence today. Needless to mention, the Stanford-Binet, Raven's Progressive Matrices, the Wechsler Adult Intelligence Scale, and the Kaufman Assessment Battery for Children that are widely used in various settings including education, business, and military due to their power in predicting successful behaviors. A number of contemporary scholars argue that tests of intelligence have limited predictability power outside academia and make evidence available that tests of intelligence are at best predict students' performance in schools, but not outside school context (Ceci & Liker, 1986; Sternberg, 2000; Sternberg & Grigorenko, 2002, 2003; Sternberg, Nokes, Geissler, Prince, Okatcha, Bundy, & Grigorenko, 2001; Sternberg & Ruzgis, 1994).

The contagion of intelligence testing cross the academic boundaries to other areas including the identification of gifted and various talent development programs. Intelligence, as measured by IQ tests, predominates the field of education of the gifted and talented students, and tests of intelligence became the most recognized instruments to identify gifted students neglecting other important instruments for personal attributes that are associated with high performers in diverse human endeavors. For example, many schools, programs, and alternative opportunities for gifted students in many centuries recognized tests of intelligence as a major criterion to qualify students for special programs. Nonetheless, the persisting question, does intelligence, as measured by IQ tests, account for such complex phenomena?

Intelligence has been defined today in a broader sense than before. Many scholars argue that intelligence is what constitute success in any culture (Baron, Byrne, & Baron, 2004; Cacioppo, 2004; Gardner, 1993; Neisser, 1976; Richardson, 2002; Sternberg, 1988, 2003; Sternberg & Grigorenko, 2004b). In these contemporary views, intelligence is a relative concept and accordingly it's based on how each culture perceives success? Further, Sternberg's views on intelligence involve that intelligence happens due to continuous interactions between people and their environment which has been ignored by many intelligence theorists. Others specifically define intelligence in more narrowing terms that involves learning competencies like memory, reasoning ability, verbal ability, quantitative ability, etc. Intelligence is best understood in terms of contexts, in which it unfolds in taking into consideration a person's culture, and the quality of their interactions. Intelligence, as measured by various IQ tests predicts moderately students' academic performance. In a recent study conducted by Laidra, Pullmann, and Allik on 3618 Estonian students from grade 2 to 12, intelligence as measured by Raven's Standard Progressive Matrices was found to be the best predictor of GPA as indicator of school performance among the Big Five personality factors. The correlations were ranged between 0.32 to 0.54 (In: Kaia et al., 2007). Intelligence correlates with academic performance moderately as Niesser et al. (1996) reported that intelligence scores correlated approximately around 0.5 with scores on various academic indices depending on which measures were used (Neisser, Boodoo, Bouchard, Boykin, Brody, & Cesi, 1996). Thus, intelligence accounts only around 25% of students' academic performance. Hence, what are the other factors explaining the remaining variance?

Self-control and Academic Performance

Self-control is conceived as a core feature of an individual that leads to success and happiness in life. People who control or regulate their desires, behaviors, performance and responses, achieve better in various domains than others. Modern psychology, views human behaviors from a biopsychosocial perspective (Ceci, 1996; Dai & Sternberg, 2004; Gottfredson, 2001; Maker, Rogers, Nielson, & Bauerle, 1996; Neisser et al., 1996; Sternberg & Grigorenko, 2004b) that is people's acts cannot be explained in the absence of social and biological contexts. The social cognitive theorists believe that our behaviors are influenced through social learning by observing others and are subject to our thoughts or what we think about the situation. That

is whether we have control on our lives or surrounding events have control on us, is considered an important trait that is associated with achievements of people. Julian Rotter distinguishes between the external and internal control, where external control refers to one's perception about outside forces and events control their destiny and internal control regards as one believe that s/he has control on his life (Burger, 2004). Researchers reported that internals are more successful in school and work than do externals (Myers, 2010). The reason is that people with internal self-control have the ability to suppress their gratification aiming for lasting desired outcomes. Ericson refers to this as the ten-year rule that consists a universal ingredient of high performances in chess, dancing, sports, computer programming, etc. that is about ten years of intense daily training. Indeed, people are not born with demonstrated talents. High level of performance comes with intensive practice for years. With high self-control and persistence, people highly achieve their goals with excellence. Educational researchers refer to self-control in academia as self-regulated learning.

Self-Regulated Learning (SRL) is a concept in educational psychology. It is used to illustrate the learning process that is guided by one's-self. SRL is defined as "an active, constructive process whereby learners set goals for their learning and then do monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and contextual features in the environment" (Zeidner, Pintrich, & Boekaerts, 2000, p.453). The definition implies that SRL is a complex process that includes higher-and-lower order cognitive processes supported by high motivational level to achieve goals in academic domain. Zimmerman emphasizes that the common attributes of students, who are self-regulated learners, include metacognitively, motivationally, and behaviorally active participation in their learning (Zimmerman, 1990). Magno hypothesize that self-regulated learning is influenced by effect of activation, whereby the effect of activation consists of persistence (self-directed attention), initiative, disengagement (impulse control), and self-determination (Magno, 2008). The above mentioned definitions manifest the following processes: planning, setting goals, organizing, self-monitoring, self-evaluation, high self-efficacy, intrinsic motivation, persistence, structure, time management skills, and selecting environment for their learning. Students who have high degree of SRL tend to believe that success is attainable and it's under their control. As a result they exert all possible efforts to achieve their goals and desires. In contrast, those who have low SRL tend to attribute their failure to external factors beyond their capacity. They find reasons to withdraw from tasks and school work. Scholars reported that deficient learning and work habits, low control conviction levels, poor self-concepts are among causes of underachievement (Stoeger & Ziegler, 2005). Stoeger reported that gifted students are in need for SRL skills for several reasons: (a) the impact of SRL on academic performance, (b) SRL is very important in challenging environment (e.g., gifted schools and programs), (c) SRL is important to reach high level of performance in talent domains, (d) SRL associated with deliberate practice in any performance domain, and (e) SRL is important to help underachieving gifted students (Stoeger, 2010). Zimmerman argued that SRL students approach tasks with confidence, diligence and resourcefulness and proactively seeks their goals (Zimmerman, 1990). High self-

control and motivation predict academic performance. ACT research shows that high motivation and self-control are associated with high GPAs (ACT, 2007). Lindner and Harris (1990) reported that academic performance as measured by GPA correlated significantly with SRL ($r=0.54, p<.001$) in a sample consisted of 160 college students. The instrument was an inventory which consisted of 71 items distributed into five categories: metacognition scale (reliability coefficient, .77), learning strategies scale (reliability coefficient, .83), motivation scale (reliability coefficient, .77), contextual awareness/sensitivity scale (reliability coefficient, .64), and environment utilization/control scale (reliability coefficient, .79). In a meta-analysis paper of 109 studies that examined the relationship between psychological and study skills and college outcomes as measured by GPA and retention rate, the authors found that the best predictors of GPA were self-efficacy and achievement motivation ($r= .496$ and $.303$, respectively) other than academic-related skills (Robbins, Lauver, Davis, Langley, & Carlstrom, 2004). In the well-known Marshmallow study, academic and cognitive performance correlated significantly with delay time (Shoda, Mischel, & Peake, 1990).

Purpose of the Study

The author of the current study investigated the role of intelligence and self-control on academic performance of academically gifted and non-gifted students. In many studies, researchers have shown the role of intelligence on academic success. However, the role of self-control in academic performance and its interacting with intelligence needs more research. In this study, the author explores the role of self-control with regard to academic performance and underpinned how intelligence interacts self-discipline to predict academic performance. Additionally, various cognitive, emotional, and personal constructs have roles to play with human performance. In this study, the author explores the role of intelligence and self-control as personality qualities in academically gifted students.

Method

The current study aims at investigating the predicting power of intelligence and self-control of students on academic performance of gifted and non-gifted students. The criterion variable was GPA of students and the predicting variables were intelligence (verbal ability and quantitative ability) and self-discipline. The author used the linear multiple regression statistical model to assess the predicting power of intelligence and self-control on academic performance.

Participants

Participants in this study were 74 freshmen male college students at the eastern province of Saudi Arabia. Students were assessed on their general ability prior to their admission to a special education program at The College of Education with average mean 73.0 ($SD=8.0$). The average of their Grade Point Average (GPA) was 2.68 out of 5.0 ($SD=.81$). Students' major in high school were literature and arts. The gifted students sample was drawn from the original

sample based on their academic performance as indicated by GPA. Scores of one standard deviation above the mean of students GPAs were considered a range in which academically gifted students sample fall while non-gifted students are below the GPA 3.5 out of 5.0. With this criteria 16 students were labeled as gifted in this study.

Measurements

General Ability Test. Scores on GAT is one of the predicting (independent) variables of academic performance in the current study. GAT is like SAT test. Since the year of 2000, the higher education in Saudi Arabia has established a National Center for Assessment in Higher Education (Qiyas). Qiyas aims at developing standardized general ability and achievements tests whereby the results of these tests are among admission requirements for the higher education institutes. This test is a high stake test that almost all high school students today should take in order to get admission in Saudi universities. GAT consists of two subtests: verbal and quantitative. The GAT aims at assessing analytical reasoning and students' readiness for learning (Qiyas, 2011). In specific, GAT measures the following abilities, reading comprehension, ability to understand logical relationships, solving problems based on basic mathematical concepts, and deductive and inductive reasoning (Qiyas, 2011). The verbal subtest consists of 68 questions for science track students in high school and 92 questions for literature track students. Four types of questions are presented in this subtest, reading comprehension, verbal analogy, sentence completion, and words meanings. The quantitative subtest consists of 52 questions for science track students and 30 questions for literature track students. This subtest includes arithmetic, geometric, algebraic, and statistic questions. The GAP is administered in two and half hours in six parts, 25 minutes for each part.

Self-Control Assessment. Self-control is another predicting variable for academic performance in this study. Self-control was assessed by observing the level of students' commitments to submit their assignments and homework timely. Students were given nine assignments during the semester and were asked to submit the assignments on a predetermined date. A student was given one point if he submitted his assignment on the proposed due date and zero if he submitted the assignment after the due date. The due dates of assignments were usually at 12:00 am every Friday of every other week during the semester. The quality of the assignments was disregarded and was not taken into consideration when scores were given. The maximum score for self-control was eight points and the lower score was zero. The reliability of the self-control scale was derived from the internal consistency of the nine assignments. As indicated by Alpha coefficient, the reliability was at the acceptable level after omitting one problematic item, $r = .73$.

Grade Point Average. The GPA is the criterion variable in this study. Students' academic performance was based on their GPA scores. The GPA scores of participants ranged from 1.41 to 4.85 out of 5.00 with mean of 2.68 ($SD = .81$). The GPA was calculated based on sixteen credit hours for eight courses after students completed the first semester.

Procedure

The author of the current study investigated the role of intelligence and self-control attributes in explaining academic performance of both gifted and non-gifted students. The predicting variables were scores on GAT and Self-control that were collected during the fall semester of year 2009. The date of criterion variable was collected during the spring semester of year 2010. Students were asked voluntarily to participate in this study and provide needed data. A simultaneous linear multiple regression model was used with both intelligence and self-control to predict academic performance as measured by students' GPA. The power was specified at $(1 - \beta) = .80$ to control for type II error and Alpha was hold at .05 to control for Type I error.

Results

Research Question 1

What are the pattern of relationship between verbal ability, quantitative ability, GAT composite scores and GPA? To answer this question, a Pearson Product-Moment correlation coefficient was used to illustrate the relationship between verbal ability scores, quantitative ability scores, GAT composite scores, self-control scores, and GPA. Table 1 shows the relationship between these scores.

Table 1. Correlations between Scores on the all Variables for All Students(N=74)

Variable	1	2	3	4
GPA	1			
Verbal Ability	.4*	1		
Quantitative Ability	.09	.33*	1	
GAT Score	.31*	.84*	.56*	1
Self-control Attribute	.58*	.13	-.01	.17

* $p < .01$

As predicted, intelligence and self-control correlated significantly with academic performance (see Table 1). Verbal ability, GAT as a measure of intelligence, and self-control significantly correlated with students' academic performance as indicated by scores on GPA. The criterion variable GPA correlated with verbal scores moderately ($r = .4, p < .01$), with GAT composite score moderately ($r = .31, p < .01$), and with self-control scores highly ($r = .58, p < .01$). The correlation between quantitative ability and academic performance was trivial and was not significant ($r = .09, p > .05$). These results were consistent with the author's predictions about factors associated with academic performance. Further, verbal scores explained around 16% of the variance on the GPA ($r^2 = .157$). Self-control, by contrast, explained around 34% of the variance on the GPA alone ($r^2 = .336$). Worth noting that intelligence as measured by GAT did not correlate with self-control, whereas predictors correlated significantly with criterion variable which made an optimal case for explaining the variance on the criterion variable. Finally, this result would support the argument that intelligence and self-control are distinct psychological constructs.

Research Question 2

To what extent do intelligence and self-control predict academic performance of students? The purpose of this research question was to investigate the role of intelligence and self-control on students' academic performance as measured by the GPA. To answer this question, a simultaneous multiple regression model was used with two independent variables: verbal ability scores and self-control scores as predictors (independent variables) and academic performance as measured by GPA as a criterion variable (dependent variable). Since the quantitative ability did not correlate significantly with GPA in the previous question, thus it was omitted from this analysis. Table 2 shows the role of intelligence and self-control on students' academic performance as measured by the GPA.

Table 2. The Multiple Regression Analysis on Academic Performance as Predicted by Intelligence and Self-Discipline for All students (N=74)

Predictor	R^2 Adjusted	F Change	β	t	r	r_p
Verbal Ability	.422	27.682*	.326* ^f	3.637** ^e	.396	.324
Self-control Attribute			.535* ^f	5.962* ^f	.577	.530

* $p < .0001$; ** $p < .001$

As indicated from Table 2, verbal ability and self-control altogether explains 42% of the variance in academic performance as measured by GPA, $R^2_{Adjusted} = .422$. The simultaneous multiple regression model shows that R^2 is significant [$F(2, 71) = 27.682, p < .0001$]. After removing the effect of the other predictor, verbal ability contributes to academic performance around 10% and self-control attribute contributes to academic performance around 28%. The power analysis showed that the above analysis has sufficient power, $(1-\beta) = 1.0$. As shown from Table 2 that the self-control ($\beta = .535, t = 5.962, p < .0001$) contributed more than the verbal ability ($\beta = .326, t = 3.637, p < .0001$) to academic performance for all students.

Research Question 3

To what extent do intelligence and self-control predict academic performance for academically gifted students? They are ranked based on their GPA scores into two groups, gifted and non-gifted. Gifted students were those who scored 3.5 and above on the GPA and the non-gifted students were those who scored below 3.5. The total number of gifted students was 16 students. A power analysis was run to ensure that the sample has a sufficient power with Alpha at .05 and observed $R^2 > .64$. The analysis showed that there is a sufficient power to run a multiple regression analysis [$(1-\beta) = .99$]. A Pearson Product-Moment correlation coefficient was used to illustrate the relationship between verbal ability scores, quantitative ability scores, GAT composite scores, self-control scores, and GPA for the gifted sample. Table 3 show the relationship between these scores.

Table 3. Correlations between Scores on the all Variables for Gifted Students Sample (N=16)

Variable	1	2	3	4
GPA	1			
Verbal Ability	.397	1		
Quantitative Ability	.731*	.589*	1	
GAT Score	.544**	.957*	.795*	1
Self-control Attribute	.615**	.225	.432	.319

* $p < .01$; ** $p < .05$

Again, as forecasted both intelligence and self-control explained academic performance for academically gifted students (see Table 3). For the gifted sample, quantitative ability, composite score of intelligence, and self-control were significantly correlated with students' academic performance as indicated by scores on GPA. The criterion variable was highly correlated with quantitative scores ($r = .731, p < .01$), with GAT composite score highly ($r = .544, p < .05$), and with self-control scores highly ($r = .615, p < .05$). The correlation between verbal ability and academic performance was moderate and was not significant ($r = .397, p > .05$). These results in general were consistent with the author's guess about factors associated with academic performance. Quantitative ability explained around 53% of the variance on the GPA of gifted students ($r^2 = .534, p < .01$). Self-control, by contrast, explained around 38% of the variance on the GPA ($r^2 = .378, p < .05$). Worth mentioning that intelligence, as measured by GAT did not correlate significantly with self-control of the gifted sample. Surprisingly, quantitative ability predicted academic performance of gifted students while verbal ability did not.

Further analysis was carried out to investigate the role of quantitative ability and self-control on performance of academically gifted students. A simultaneous multiple regression model was used with two independent variables: quantitative ability scores and self-control scores as predictors (independent variables) and academic performance as measured by GPA as a criterion variable (dependent variable). Since the verbal ability did not correlate significantly with GPA in the gifted sample, it was eliminated from this analysis.

Table 4. The Multiple Regression Analysis on Academic Performance as Predicted by Intelligence and Self-Discipline for Gifted Students Sample (N=16)

Predictor	$R^2_{Adjusted}$	F_{Change}	β	t	r	r_p
Quantitative Ability	.590	11.773*	.527**	3.117**	.731	.516
Self-control Attribute			.368***	2.007***	.615	.332

* $p < .001$; ** $p < .01$; *** $p < .05$

As indicated from the Table 4, quantitative ability and self-control together explained over 59% of the variance in academic performance as measured by GPA, $R^2_{Adjusted} = .590$. The simultaneous multiple regression model showed that R^2 is significant, [$F(2, 13) = 11.773, p < .001$]. After removing the effect of the other predictor, it is clear that quantitative ability contributed to academic performance around 27% and self-control contributed to academic performance

around 11%. As shown from Table 4 that the quantitative ability ($\beta = .527, t = 3.117, p < .01$) accounts more than self-control ($\beta = .368, t = 2.007, p < .05$) to academic performance of academically gifted students sample.

Discussion

In this study, the author examined the role of two psychological constructs, intelligence (verbal, quantitative abilities) and self-control, in explaining academic performance of academically gifted and non-gifted students. Also, the author investigated the pattern of relationships between academic and non-academic factors associated with academic performance in the first set of analyses. The multiple regression model shows that both verbal ability and self-control together accounted for over 42% of academic performance as measured by GPA. Verbal ability alone, when excluding the effect of self-control, explained around 10% of the GPA while self-control alone after removing the effect of the verbal ability accounted for over than 28%. Further, there was no significant correlation between intelligence and self-control which confirmed the author's conjecture that the two constructs are unique and both constructs explained academic performance together more than either one alone. Further, self-control outperforms verbal ability in explaining academic performance. Academic performance, therefore, is best understood in light of both cognitive and non-cognitive factors. Furthermore, psychological factors such (as) motivation, self-efficacy, self-control, self-confidence are critical attributes to success in academia and other performance domains in addition to intelligence.

The positive correlation between verbal ability and GPA could due to the fact the GPA scores are a result of courses that are heavily loaded with linguistic content other than quantitative reasoning content (e.g., Arabic and English literature, education, and psychology). Statistic was only one course out of the eight courses that students took that semester which required a numerical ability. This result was consistent with previous research that indicated the role of self-control, motivation, and self-regulated learning in academic performance (ACT, 2007; Lindner & Harris, 1992; Robbins et al., 2004; Shoda et al., 1990). Thus, quantitative ability did not correlate significantly with GPA. Intelligence (the composite score of both verbal and quantitative ability) correlated significantly with academic performance. On the other hand, self-discipline, even though it was measured in only one course (eight different instances), was a powerful predictor of GPA more than intelligence in this study. Yet this result has to be taken with precaution because of the limitations of the current study.

In the second set of analyses that concerned with academically gifted students, the analyses showed different patterns of results. The multiple regression model showed that quantitative ability and self-control accounted for over 59% in GPA variance. Quantitative ability alone, when excluding the effect of self-discipline, explained over 27% of the GPA while self-control alone, after removing the effect of the quantitative ability, accounted for around 11% of the GPA variance. Quantitative ability outperformed self-control in explaining academic performance for the academically gifted students' sample. Thus, for academically gifted students'

sample, the verbal ability had little to say about their performance and self-control accounted only for a limited portion of variance in the GPA. Possible interpretation of such results is that gifted students relied on their quantitative reasoning for high level of performance more than their verbal ability.

Implications and Limitations

Identification authorities of academically gifted students should consider in addition to intelligence and other personality factors such as self-control. The recommendations of the current study preferably should be used by practitioners and specialists in the education and especially in the education of gifted students. First, intelligence is not the only determinant criterion for selecting academically gifted students. Some other psychological constructs such as self-control, motivation, self-efficacy, commitment to school, and self-regulation are also important factors ensuring high performance. In addition, programs for the gifted must capitalize on the role of self-control in academic success and develop students' ability to control their behaviors in order to achieve high levels of performance. Future research can focus on self-control with successful performance in various domains.

Several limitations regarding gender, sample selection and self-control scale surrounding the current research leave a room for other interpretations, considerations and generalization. As mentioned, all participants were male and selected on voluntarily bases, the reliability of self-control is barely sufficient and observation of this trait was only conducted in one semester and in one course. These limitations should be considered when conclusion has to be made from this study.

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