

Identifying the predictors of academic achievement

The relationship between IQ, EQ, Motivation, Stress and Grades

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Abstract

*The aim of this thesis is to investigate the relationship between grades, intelligence, motivation and test-related stress while identifying the predictors of academic achievement. The research also included two hypotheses: 1. IQ, EQ and Motivation will have a positive correlation with academic achievement; 2. Test-related stress will have a negative correlation with academic achievement. **Methods:** 93 participants from various universities, backgrounds and courses were selected using an opportunistic sampling technique. The participants took part in four online questionnaires, an IQ test, the Trait Emotional Intelligence Questionnaire (Short-Form) (Petrides and Furnham, 2006), Motivated Strategies for Learning Questionnaire (Pintrich et al., 1991), and the Test Anxiety Questionnaire (Nist and Diehl, 1990). **Results:** A Pearson's correlation test demonstrated that the results agree with both hypotheses. While a multiple regression analysis revealed that IQ scores is the only statistically significant predictor of academic achievement. **Conclusion:** Applications of these results are discussed in light of previous research while relating to theory, limitations and future research. Further analyses revealed interesting results regarding self-efficacy, stress and intrinsic and extrinsic motivation, these findings and their implications are also discussed.*

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Introduction

Our academic success undoubtedly plays an important role in our lives, affecting not only our academic future, but also our self-worth, happiness, success and others' perception of us (Frankel, 1960). Therefore, examining the factors that predict this measure is very important. Academic success refers to the extent that a student achieves their academic potential, and is determined via average test result scores, which are designed to measure our academic capabilities in terms of procedural and declarative knowledge (Ward et al., 1996). Over the past several decades, researchers aim to determine what factors influence academic performance. Some previous studies have linked academic performance to intelligence, personality (Stumm et al., 2011), attitudes toward education (Magnuson, 2007), self-efficacy (Shams et al., 2011), working memory (Tomprowski et al., 2008), motivation (Kitsantas et al., 2008), emotional intelligence (Cherniss, 2010), stress (Sohail, 2013) and genetics (Jencks and Phillips, 2011) among other factors. This research aims to investigate in debt what is a better predictor of academic success measured in grades between intelligence, motivation, emotional intelligence and test related stress, relating to theoretical framework and self-efficacy.

Intelligence

Although researchers still argue about what exactly intelligence is, the ability to deal with cognitive complexity (Gottfredson, 1998), an innate ability that we can't change or manipulate (Burt, 1954), or the ability to effectively deal with our surrounding environment (Wechsler, 1944), most researchers agree that intelligence and quality education can predict future success, social status, morbidity and mortality, mental

health, criminality and conduct disorders, resilience and mating success among other factors (Jokela, et al., 2009; Stattin, et al., 1993; Perlmutter and Nyquist, 1990; Gottfredson and Deary, 2004; McNally and Shin, 1995; Greengross and Miller, 2011).

One of the most influential theory to contradict the traditional views of intelligence, was Howard Gardner's Theory of Multiple Intelligences (Gardner, 1983), where he talks about eight aspects of intelligence: musical-rhythmic, visual-spatial, verbal-linguistic, logical-mathematical, bodily-kinaesthetic, interpersonal, intrapersonal and naturalistic. His theory was very controversial, criticized for not having enough empirical evidence (Waterhouse, 2006), and for having a subjective definition of "intelligence" (Davis, et al., 2011). Many researchers argue however, that the scholastic interpretation of intelligence is very one-sided (Svensson, 1971), and many claim that most academic tests only address linguistic, logical, and spatial intelligence (Gardner and Hatch, 1989). Many educational programmes like Purpose Driven Education have implemented the idea of multiple intelligences, to celebrate individuality in one's abilities. Another theory stating that intelligence isn't one-sided is Sternberg's triarchic theory of intelligence (Sternberg, 1985), where he divides intelligence into three distinct categories: analytic which is the form of intelligence that is tested in schools, experiential which deals with how efficiently a task is performed compared to its familiarity (Sternberg, 1997), and practical which involves adapting to the environment using adaptation, shaping and selection (Sternberg, 1985). Applications of this theory showed to be useful in identifying children's academic weaknesses and strengths, and to improve schools' reading programs (Sternberg, et al., 2001) this theory also demonstrated to be more effective in improving reading achievement compared to traditional academic programs (Grigorenko, et al., 2002), it also showed promising

results in the use with gifted children. Sternberg and colleagues (1996, 1995) found that the triarchic model can be used to identify and assess achievement in gifted students, also it was shown that gifted students tend to perform better when their triarchic ability pattern was matched. Mary Meeker (1969) extensively studied and implemented the Structure of intellect theory (Guilford, 1956) which deals with 150 different intellectual abilities, categorised into three dimensions – operations, content and products. She stressed that the Structure of Intellect theory aids each individual to learn more efficiently, while identifying in what areas of intelligence they are less developed (Meeker, 1969). This theory is now used in some academic settings, and applied to assess and treat learning difficulties (SOI Systems).

These theories help to understand human intelligence in a more dynamic view, not captured by conventional theories, and argue that intelligence is something beyond IQ (Weinberg, 1989). Sternberg (1998) stressed that teachers and standardized tests emphasize memory rather than thinking and problem solving. Interestingly recent research found that working memory is a more powerful predictor of academic success than IQ (Alloway and Alloway, 2010; Gropper and Tannock, 2009; Rogers, et al., 2011; Bull, et al., 2008;). However, Cattell (1971) expressed that memory is an underlying factor of intelligence, he proposes that general intelligence is divided into two factors, fluid and crystallized intelligence (Cattell, 1971). Fluid intelligence refers to the ability to reason and solve problems on the spot, without previous knowledge (Jaeggi, et al., 2008) while crystallized intelligence refers to one's general knowledge of the world, often involving long-term memory (Jaeggi et al., 2008; Geary, 2005). Researchers argue whether intelligence could be improved by practicing working memory tasks, some studies show that improving and practicing working memory can significantly increase

their matrix test scores (Jaeggi, et al., 2010; Feiyue, et al., 2009), others do not support these findings, stating that even when participants improve their performance on working memory tasks, there is no significant improvement in intelligence scores and working memory capacity (Chooi and Thompson, 2012; Redick et al., 2013).

Some studies show a positive reciprocal relationship between scholastic performance and IQ, meaning that high IQ is a predictor of high grades (Frey and Detterman, 2004) and effective schooling influences IQ, encouraging memory strategies, promoting successful test taking and teaching children factual knowledge (Ceci, 1991). However, is this due to scholastic performance and IQ representing intelligence, or since both academic tests and IQ tests are very similar in the areas that they are testing, like memory, mathematical skills and spatial knowledge, they may be measuring the same concept, which is not necessarily intelligence.

Some studies acknowledge the impact of IQ on academic performance, however researchers disagree with the magnitude of the expressed significance and reveal that emotional intelligence also significantly affects academic achievement.

Emotional Intelligence

Salovey and Meyer (1990) describe emotional intelligence as “the ability to monitor one’s own and others’ feelings and emotions, to discriminate among them and to use this information to guide one’s thinking and actions” (p. 189). Although historically emotion and intelligence were viewed as complete opposites (Lloyd, 1979), today emotion reflects certain aspects of intelligence and is fundamental in understanding interpersonal dynamics (Mayer, 2008). Today there are two scientific approaches to emotional intelligence, the ability model, the trait model and the mixed models. The

ability model views emotions as a source of information which aids understanding and perceiving the social environment (Salovey and Mayer, 1990; Salovey and Grewal, 2005), emotional intelligence is also viewed here as a standard intelligence because it arguably meets the criteria for an intelligence (Mayer et al., 2008; Mayer and Salovey, 2001; MacCann et al., 2014). The Mayer and Salovey (1997) model of emotional intelligence proposed that there are four “branches” that make up emotional intelligence: perception of emotion – the ability to identify and understand other peoples’ emotions using cues such as sound, language and behaviours; the second branch is the use of emotion – referring to harnessing emotions to facilitate cognitive tasks such as problem solving or interpersonal communication, more advanced skills of this branch involves changing moods to facilitate different thinking styles for different tasks at hand; the third branch involves understanding and analysing emotions, including transitions between emotions; the last branch involves management of emotions – which not only involves regulating one’s emotional state, but also being able to make appropriate decisions at any given emotional situation.

Mixed models however, incorporate personality traits and competencies into emotional intelligence such as self-regulation, empathy, motivation (Goleman, 1988). Goleman’s (1988) model of emotional intelligence involves 5 main constructs: self-awareness – the ability to aware and understand one’s emotions, drives, values and goals; self-regulation – the ability to adapt to circumstances and control one’s emotions and impulses; social skill – the ability to form and manage relationships; empathy – the ability to consider other peoples’ feelings; and motivation – the ability to be motivated and driven to achieve set goals.

Trait models of EI are usually measured using self-report questionnaires, and although these are often favourable because they are easier to administer, less costly and less time consuming (Brackett et al., 2006) self-report measures can often be inaccurate because participants can give socially desirable answers or respond how they see themselves versus how they are (Brackett and Mayer, 2003). One of the most used self-report measures of EI is The TEIQue, an operationalization for the model of Petrides and colleagues which view EI in terms of personality traits (Petrides et al., 2003). Research using self-report measures of EI demonstrated that it positively correlates with better social relations, are better perceived by others, better academic achievement and psychological wellbeing (Mayer, 2008). Researchers however demonstrated that performance tests and self-report measures of emotional intelligence show very distinct results, even when the self-report measures are designed to mirror performance tests (Van Rooy et al., 2005; Mayer et al., 2002). One of the most used emotional intelligence performance test is the Mayer-Salovey-Caruso emotional intelligence test (MSCEIT; Mayer et al., 2002), it was demonstrated to measure and predict psychological and behavioural constructs above existing measures of intelligence and personality, and was shown to correlate with outcomes such as cognitive functioning, psychological well-being, academic performance, leadership and social skills among other factors (Cherniss, 2010; Mayer et al., 2008). Van Rooy and colleagues (2005) found a correlation between MSCEIT and verbal and spatial intelligence, other studies found correlations with reasoning ability (O'Connor and Little, 2003), SAT scores (David, 2005; Brackett et al., 2004) WAIS scores (Lopes et al., 2003), and those with high scores showed the ability to quickly solve complex social problems (Reis et al., 2007). Emotional intelligence is often hypothesised to aid academic performance, some

studies show associations between the two (Barchard, 2003). Gil-Olarte and colleagues (2006) showed a significant correlation between the MSCEIT and grades in high school students, even after controlling for personality and academic intelligence, these results were also replicated by Rivers and colleagues (2010) in middle school students, however there was no correlation with college students' grades. Other correlates were also found such as mental health (David, 2005; O'Connor and Little, 2003; Gardner and Qualter, 2009), work performance and school attitudes (Rivers et al., 2008; Ashkanasy and Daus, 2005; Brackett et al., 2010) and social functioning (Lopes et al., 2005; Brackett et al., 2005; Kafetsios, 2004). Other researchers found that emotional intelligence has a more reliable association with academic achievement and future success among other factors compared to IQ (Parker, et al., 2004; Parker, et al., 2004; Abdullah, et al., 2004; Graziano, et al., 2007), it was also shown to be a better predictor of cognitive performance (Lam and Kirby, 2002).

Based on these and many more findings, researchers developed the RULER approach to learning, which gives students, teachers and family members the opportunity to develop the skills to be able to Recognize, Understand, Label, Express and Regulate emotions effectively (Brackett, Rivers and Salovey, 2011). This approach incorporates both Goleman's (1988) and Mayer and Salovey's (1997) models of emotional intelligence and their branched. This approach is now used in many school programmes including Yale university to aid the participants to make better decisions, form meaningful relationships, improve prosocial behaviour and learn to regulate and accurately express their emotions. RULER classrooms showed to have a more positive learning atmosphere and greater enthusiasm about learning, fewer reported bullying, more prosocial behaviour and positive interaction between students and teachers (Brackett et

al., 2010) and these factors were shown to be fundamental in a better academic achievement (Reyes et al., 2010). These findings pose the question whether it is emotional intelligence that affects academic performance, or is it the subsequent behaviours and psychological constructs formed due to higher emotional intelligence. The concept of EI was often criticised for being abstract and invalid (Mattiuzzi, 2008; Landy, 2005), other note that it is a desirable moral quality, not a skill (Grant, 2014), while others stress that the correlation between EI and various other constructs are because EI questionnaires measure a collection of personality traits (Mikolajczak et al., 2007; Smith et al., 2008; Austin, 2008). Instead, many researchers shift their focus on motivation as a predictor of academic achievement.

Motivation

Motivation plays a crucial role in academic achievement, it stimulates students to achieve their goals, to complete assignments or to study for an exam, it gives reason behind our actions and can explain why we behave a certain way (Linnenbrink, 2002). Psychologists divide motivation into two groups: extrinsic motivation which is driven by external rewards such as praise, money, status; and intrinsic motivation which refers to motivation that is internally rewarding such as the degree of satisfaction in performing a certain task. Although some researchers say otherwise, and deny the idea of intrinsic and extrinsic motivation as being independent from each other (Dermer, 1975) research shows that intrinsic motivation and task-interest show significantly better results in academic performance than any kind of extrinsic motivation and rewards, including tangible and expected rewards (Deci et al., 1999; Goodman et al., 2011). This is especially important in classrooms as research shows that teachers

who extrinsically reward their students leads to them depending on these rewards and therefore their intrinsic motivation to engage in academic tasks decreases (Williams and Stockdale, 2004). Instead teachers should promote self-determination in students by providing them with opportunities for leadership and challenges while engaging in feedback and establishing a good teacher-student relationship, these were shown to promote student interest, intrinsic motivation, competence and desire to be challenged (Deci and Ryan, 2002; Reeve et al., 2003). These findings agree with Achievement Goal Theory, which emphasizes the importance of task interest and leads to a boosted self-concept, many researchers support this theory, agreeing that self-efficacy, academic goals and self-motivation can be more important in academic achievement than IQ (Zimmerman, et al., 1992; Bandura, 1993, Meece, et al., 2006; Kitsantas, et al., 2008). Motivation was shown to significantly affect academic achievement numerous times in relation to test performance (Jaschik, 2013), mathematical achievement (Tella, 2007) medical education (Kusurkar et al., 2013) and general academic achievement shown cross-culturally (Ayub, 2010; Oriahi, 2009; Peklaj et al., 2006; Amrai et al., 2011; Li and Pan, 2009). Academic motivation refers to the behaviours that lead to academic achievement, through doing assignments, putting effort into learning, and choosing assignments which might be harder but can learn from in order to reach mastery (Pajares and Urdan, 2002). In recent years, researchers acknowledged the importance of motivation in academic settings, and expressed that it should be taken into account when developing academic skills (Amrai et al., 2011). Ormrod (2003) concluded that motivation affects academic learning through engaging in goal-directed behaviour, leads to increased efforts, initiation, persistence, performance and cognitive processing, and determines what behaviours are reinforced.

Self-efficacy – the extent of one’s belief about one’s own ability to effectively complete tasks and reach goals (Bandura, 1994) was shown to be closely positively associated with motivation because it stimulates individuals to be more persistent in their efforts and be motivated to achieve what they believe they can achieve (Bandura, 1977; Schunk, 1990; Zimmerman, 2000; Walker et al., 2006; Schunk, 1991). Self-efficacy was also often shown to predict academic performance (Zimmerman et al., 1992), Andrew and Vialle (1998) found that individuals who are confident in their strengths typically take control of their own learning, participate in class more and prefer hand-on learning, while those with low self-efficacy avoid academic interactions. Research concerning academic writing demonstrated that an elevated self-efficacy correlates with higher effort, persistence and perseverance while influencing thought patterns and emotional reactions when completing academic assignments, and those students also chose harder and unfamiliar tasks (Pajares, 2003; Pajares and Johnson, 1994; Schunk, 2003). These findings agree with expectancy theory (Vroom, 1964) that self-efficacy is a fundamental aspect of motivation. This theory explains that certain behaviours are optimal over other behaviours because of one’s motivation, which in turn is affected by expectancy (self-efficacy), instrumentality (perception of reward) and valence (perception of the amount of reward). Research also suggests that self-efficacy can affect one’s locus of control, high self-efficacy indicates an internal locus of control which in turn was positively related to academic success (Whyte, 1979; Findley and Cooper, 1983; Bar-Tal and Bar-Zohar, 1977; Au, 2015). Motivation and locus of control were also positively associated with the strength of error-monitoring system, demonstrating that highly motivated students with an internal locus of control were

better at detecting errors and this contributed to a better academic performance (Fisher et al., 2009).

Researchers show that stress and academic performance are closely related because test-anxiety reduces performance even in cases of high intrinsic motivation, internal locus of control, higher IQ and EQ.

Stress

Moen and Doyle (1978) showed that positive motivation and a lack of punishment in academic settings show a positive association with learning, this is because positive motivation reduces anxiety which in turn reduces performance in complex tasks.

Research also shows that intrinsically motivated students have significantly lower levels of stress, also low levels of motivation are show significantly higher levels of stress (Baker, 2004; Rucher, 2012). This might be due to the fact that as previously mentioned, motivated individuals are more likely to be persistent and have increased performance and higher efforts (Ormrod, 2003). These findings might also be because motivation was shown to be closely related to self-efficacy and an internal locus of control (Zimmerman, 2000; Walker et al., 2006; Au, 2015; Whyte, 1979), and therefore these individuals have a better perception about one's own ability which leads to lower levels of stress. Stress was shown numerous times to negatively affect academic performance (Elias et al., 2011; Akgun and Ciarrochi, 2003; Sohail, 2013). These findings indicate that individuals who are not motivated are more likely to have low self-efficacy and higher levels of stress which were demonstrated to impair performance, and an external locus of control which leads to a less active error-

monitoring system (Fisher et al., 2009), an interplay between these factors can greatly negatively affect academic performance.

Rationale

Concluding the previously mentioned research, intelligence was always subject to contemplation, interpretation and research. Compared to earlier theories of intelligence, it is now viewed as a more dynamic construct than it used to be, and many researchers doubt that IQ is the only valid predictor of one's academic performance. Emerging studies suggest that other factors are more accurate determinants of academic performance such as self-discipline (Duckworth et al., 2012; 2005; 2006) personality (Conard, 2006), teacher expectancy (Ronsenthal and Jacobson, 1966) motivation (Meece et al., 2006) emotional intelligence (Parker et al., 2004; Parker et al., 2004) and self-concept (Marsh and Martin, 2011; Marsh and Seaton, 2013) among other elements. Academic success showed to be very important not only in academic setting but also in determining factors such as future success, self-worth and happiness. Today, academic success is measured using standardized tests to determine the level of procedural and declarative knowledge (Ward et al., 1996) of an individual which in turn is marked by grades. Researchers believe that psychometric tests only evaluate linguistic, logical-mathematical and sometimes spatial aspects of intelligence, and that they evaluate competence rather than intelligence (McClelland, 1973). They also mention that there is only a low positive relationship between academic accomplishment and future success (Baird, 1985). This study aims to test if in fact IQ is the best predictor of academic success which will be determined by grades, or if emotional intelligence, and motivation can have a higher association with academic success. This research will not extend to a consideration of memory, genetics, teacher expectancy, personality or other

factors which might impact intelligence due to time and resource constraints, it will instead focus on the impact of IQ, motivation and emotional intelligence, and will also include the effects of test-related stress as research shows that anxiety during tests can lead to a negative impact on academic performance (Cassady and Johnson, 2002; Eysenck, 1979; Elias et al., 2011; Sohail, 2013).

This research will investigate the following research question and hypotheses:

1. Which variable between the degree of motivation, test-related stress, IQ and EQ is a better predictor of academic performance.

Hyp 1. IQ, EQ and motivation will have a positive correlation with academic performance.

Hyp 2. Stress will have a negative correlation with academic performance.

Methods

Participants

The participants of the study were 93 college students from different universities ranging from the ages of 18 to 34 mean age being 21.67 voluntarily participated in this experiment. There were 43 females and 50 males that participated in the study from various backgrounds. They were selected using an opportunistic sampling technique from the college student population which is a non-probabilistic sampling technique and involves using participants that are available to take part in the study, rather than get a list of all subjects in a population and randomly select a sample. Due to this sampling technique, many groups of the population could have been omitted, for example students who repeated a year in college or dropped out of college due to low grades.

This sampling technique also doesn't ensure equal participants from different colleges, courses or cities. This research also did not include older populations who are no longer in college, because their greater amount of life experiences could alter their results, although it was demonstrated that IQ remains relatively stable (Whalley and Deary, 2001) other factors such as EQ (Fariselli et al 2008) and motivation (Boumans et al., 2011) increase during adulthood while stress decreases (Bergdahl and Bergdahl, 2002), these factors can have implications for the results. Another exclusion criterion was applied to those with learning difficulties as this can distort the results. This sampling technique was used due to time and resource constraints, this sampling technique might be a disadvantage to the study because researchers argue that it involves systematic bias and a lack of external validity (Ozdemir et al., 2011; Farrokhi and Mahmoudi-Hamidabad, 2012; Jannink et al., 1995) it is however faster, readily available and cost effective.

Design

This research is nature with a cross-sectional experimental design focusing on college students. The participants were selected using a non-probabilistic purposive sampling technique, they were of the mean age of 21.67, from different backgrounds, sex, courses and universities. They were asked to take part in an online survey and were informed about the nature of the survey. Upon starting the survey, they had to read an informed consent form which explained the nature of the questionnaires, how many there are and what they are evaluating, they were also informed that they will be asked about the average test scores in college which was used as a dependent variable, and that the questionnaires are voluntary and anonymous, but the results will be used for further examination and dissertation. The participants were then asked to either accept or

decline the terms and conditions, if they declined, the survey would end, if they accepted, they could start the questionnaires. The results of each questionnaire are then used as independent variables to be correlated with their grades (dependent variable).

Procedure

The questionnaires of the study were administered online using www.typeform.com, emotional intelligence, motivation and stress questionnaire questions were copied and pasted into the online form, while participants were asked to visit the IQ website and include their scores in the online form. The participants were approached and asked if they would like to take part in a study that investigates the predictors of academic performance, and given the link to the online questionnaire. In the first page of the questionnaire the participants are informed about the nature of the questionnaire, how many questionnaires they are asked to take part in, and they are informed that they will be asked to give their average test result scores (See appendix 5). In the next slide of the questionnaire, the participants are informed about the aim of the study and are asked for their consent in voluntarily taking part in the study, while being informed that the questionnaire does not require identifying personal information and that these questionnaires will be further used for examination and dissertation (See appendix 6). The participants are then asked to provide their average test result scores, choosing between 0-39%, 40-49%, 50-59%, 60-69% or 70%+, their gender and age. They are then prompted to visit the IQ test webpage, complete the test and enter their test result scores. The following slide, the participants are informed that the next questionnaire evaluates motivation and are asked to answer as accurately as possible with a number that describes them best from 1 to 7 (see appendix 7). After completing the 31 questions, they were again informed about the following questionnaire which was an

EQ questionnaire (see appendix 8), and after those 30 questions were completed, they were informed about the last questionnaire, which was the test-anxiety questionnaire (see appendix 9). The average time to complete all 4 questionnaires was 17 minutes, at the end of the questionnaire the participants are thanked for their participation, and provided with an email address if they wish to follow up on the results of the study.

Materials

Intelligence Questionnaire

Intelligence was measured using an online questionnaire retrieved from www.free-iqtest.net, which is a self-assessed intelligence test. It includes 20 questions (see Appendix 1). Although the website does not specify what areas of knowledge the test evaluates, the 20 questions explores various kinds of intelligence tests including general knowledge (e.g 1, 7, 11, 13), arithmetic (e.g 2, 4, 9, 10, 14, 15), abstract-reasoning (e.g 3, 6, 7, 11, 13, 14, 17, 18), visual and spatial imagery (e.g 5, 16, 19, 20) and verbal and vocabulary (e.g 13, 12, 11). A study on the reliability of self-assessed tests showed a statistically significant correlation between these tests and academic performance in undergraduate students (Chamorro-Premuzic and Furnham, 2006). While another study found that self-report measures of intelligence have a low correlation with IQ tests (Paulhus et al., 1998). Although there are few studies that focus on the relationship between online IQ tests and academic performance, research acknowledges the importance of the various kinds of intelligence skills that are evaluated in this test. Kurtz (1980) found that performance on abstract reasoning tests has a positive correlation with performance on tests, while Kulp (1999) showed that visual perception and analysis significantly relate to academic performance.

Emotional Intelligence Questionnaire

Emotional Intelligence will be measured using the Trait Emotional Intelligence Questionnaire (Short Form) (TEIQue-SF) (Petrides and Furnham 2006), it is a 30-item questionnaire measured on a 7 item Likert scale, 1 being completely disagree and 7 completely agree (See Appendix 1) based on the long form of the TEIQue (Petrides and Furnham, 2003). It is designed to measure global trait emotional intelligence and includes two items from each of the 15 subscales of the TEIQue based on the correlation with the total subscale scores to ensure internal consistency (Petrides and Furnham, 2006). Cooper and Petrides (2010) and Petrides (2009) examined the psychometric properties in 2 studies using the TEIQue-SF with 1,119,455 men in the first study and 866,432 men in the second study and concluded that this instrument demonstrated good psychometric properties at global level. The TEIQue was shown to predict pro-social and antisocial behaviour while examining children's peer relationships (Petrides et al., 2006), it was shown to predict job control, job stress, job satisfaction and organizational commitment (Petrides and Furnham, 2006), psychological well-being and peer-rated social competence (Mavroveli et al., 2007; Mikolajczak et al., 2009), empathy deficits in psychopathy and Machiavellian intelligence (Ali et al., 2009) and happiness (Furnham and Petrides, 2003) among other factors. Petrides and colleagues (2010) examined the relationship between TEIQue-SF and Big Five in Dutch samples and supported its cross-cultural validity and suitability for rapid assessment of global trait EI. In examining its psychometric properties in French samples (Mikolajczak et al., 2007) it was found that the TEIQue scores are normally distributed and reliable, scores were dependent on gender but independent of age, it demonstrated discriminant validity and criterion validity predicting depression,

anxiety and emotional reactivity among other factors. It positively related to personality dimensions (optimism, agreeableness, openness and conscientiousness) while negatively correlating with others (alexithymia and neuroticism). It also demonstrated incremental validity above social desirability in responses and the five-factor model of personality. The reason why the short form will be used is because otherwise it might result in the questionnaire being unnecessarily long, which might result in the participants to get bored or frustrated which might impact their answers and lead to inaccurate results (Wallace et al., 2003).

The TEIQue-SF is divided into four subscales which measure well-being (items 5, 9, 12, 20, 24, 27), sociability (items 6, 10, 11, 21, 25, 26), emotionality (items 1, 2, 8, 13, 16, 17, 23, 28) and self-control (items 4, 7, 15, 19, 22, 30), items 3, 18, 14, and 29 do not belong to any scale and contribute only to the global emotional intelligence score (Petrides and Furnham, 2009; Petrides, 2009) (See Appendix 1). Items 16, 2, 18, 4, 5, 7, 22, 8, 10, 25, 26, 12, 13, 28, and 14 are reverse-scored (Petrides and Furnham, 2006). A low score on the TEIQue-SF results in low emotional intelligence and a high score resulting in high emotional intelligence. The TEIQue-SF questions also relates and supports the Mayer and Salovey (1997) model of emotional intelligence mentioned earlier, and its four branches; perception of emotion (e.g I'm normally able to "get into someone's shoes" and experience their emotions), use of emotion (e.g On the whole, I have a gloomy perspective on most things), understanding emotions (e.g I often find it difficult to see things from another person's viewpoint) and management of emotions (e.g I usually find it difficult to regulate my emotions). It also relates to the 5 main constructs of Goleman's (1988) model of emotional intelligence; self-awareness (e.g Many times, I can't figure out what emotion I'm feeling), self-regulation (e.g I usually

find it difficult to regulate my emotions), social skill (e.g. I find it difficult to bond well even with those close to me), empathy (e.g I'm normally able to "get into someone's shoes" and experience their emotions) and motivation (e.g I normally find it difficult to keep myself motivated) (See appendix 1). The TEIQue-SF also includes some questions that deal with self-efficacy (e.g. 24. I believe I'm full of personal strengths; 26. I don't seem to have any power at all over other people's feelings; 27. I generally believe that things will work out fine in my life.). As previously mentioned, self-efficacy was also often shown to predict academic performance (Zimmerman et al., 1992), studies show that individuals who are confident in their strengths typically take control of their own learning, participate in class more and prefer hand-on learning, while those with low self-efficacy avoid academic interactions. These findings agree with expectancy theory (Vroom, 1964) and some researchers mention that it can affect one's locus of control, high self-efficacy indicates an internal locus of control which in turn was positively related to academic success (Au, 2015). An internal locus of control was also positively associated with the strength of error-monitoring system, demonstrating that highly motivated students with an internal locus of control were better at detecting errors and this contributed to a better academic performance (Fisher et al., 2009).

A disadvantage of this questionnaire, is that it is a self-report measure, which was reported to be an a less accurate measure because participants might give socially desirable answers or respond how they see themselves versus how they are (Brackett and Mayer, 2003).

Motivation Questionnaire

The motivated strategies for learning questionnaire (MSLQ) (Pintrich et al., 1991) will be used to measure participants' motivation, it is an 81-item questionnaire measured on a 7 item Likert scale 1 being completely disagree and 7 being completely agree. It consists of two main sections, section A which consists of 31 items and assesses motivation, goals, self-efficacy and degree of anxiety related to tests and the course. Section B has 50 items and assesses participants' cognitive and metacognitive strategies for learning. The MSLQ was developed based on a social-cognitive view of motivation and self-regulated learning, where it is assumed that motivation is directly linked to the ability to self-regulate learning activities (Pintrich, 2003). This framework also assumes that motivation is not static, but rather dynamic and contextually bound, meaning that a student's motivation can fluctuate depending on the course (Duncan and McKeachie, 2005, p. 117).

For the purpose of this research, section B was not included in the questionnaire due to its length which can bore the participants but also because it does not apply to the research question (Wallace et al., 2003). The motivation section consists of six subscales which are: intrinsic goal orientation (items 1, 16, 22, 24), extrinsic goal orientation (items 7, 11, 13, 30), task value (items 4, 10, 17, 23, 26, 27), control of learning beliefs (items 2, 9, 18, 25), self-efficacy for learning and performance (items 5, 6, 12, 15, 20, 21, 29, 31) and test anxiety (items 3, 8, 14, 19, 28) (See appendix 2).

Scores are computed by calculating the means of each scale.

Pintrich and colleagues (1993) conducted several statistical analyses to determine if the questionnaire is valid and reliable, these showed factor validity, internal reliability with Cronbach's alpha greater than .70 for most scales. The scales also showed to be valid measures of motivation and cognitive constructs, and demonstrated predictive validity

of this measure regarding grades (Pintrich et al., 1991). The MSLQ was used in many research studies to assess motivation, goals, self-efficacy or strategies for learning and their implications for academic performance. When evaluating academic performance in 173 seventh graders, it was found that self-efficacy ($r = .33$) and task value ($r = .63$) positively correlated with higher levels of cognitive strategy use, (Pintrich and de Groot 1990), also higher levels of cognitive strategy use and self-regulation correlated with higher levels of achievement on all performance measures. Bong (2001) demonstrated using the MSLQ in 424 Korean middle and high school students that performance-approach, performance goals and self-efficacy are highly correlated with academic performance across all domains in both age groups. Eom and Reiser (2000) showed using the MSLQ that students that had low self-regulation were more likely to have poorer academic performance, while Miltiadou (2001) found that task value, self-efficacy and goal orientation were significant predictors of whether students completed or dropped out of online courses. Robin (2012) wrote in a review of the MSLQ that the average reliability coefficient range from .61 to .88, concluding that it can be used across a variety of samples with confidence that it will generate reliable scores.

Test related stress questionnaire

The test anxiety questionnaire (Nist and Diehl, 1990) will be used to measure participants' test-related anxiety. The test has 10 questions measured on a 5 item Likert scale, ranging from 1 - Never to 5 – Always. The scores are calculated by adding all the scores, a score ranging from 10-19 indicates a lack of anxiety, a score between 20-35 indicates a healthy amount of anxiety and a score of higher than 35 indicated an unhealthy level of test anxiety, that might impact one's performance. A study investigating the impact of test anxiety, self-efficacy and self-esteem on final

achievement scores using the test anxiety questionnaire, found a negative correlation between test anxiety and learners' final results (Fard, 2013). Another study however, investigated the predictors of learning outcomes between learning styles, school environment and test anxiety and concluded that test anxiety is the strongest predictor of learning outcomes (Ogundokun, 2011). Although there are not many studies that use this questionnaire, the questions asked (e.g. I have trouble sleeping the night before a test; My mind goes blank during a test; etc)(See Appendix 3) infer that those with a higher score on the questionnaire will exhibit lower academic performance. According to previously mentioned studies, it can be concluded that those who will score lower on the motivation questionnaire, will score higher on the test-anxiety questionnaire (Baker, 2004; Rucher, 2012) and this leads to a less active error-monitoring system (Fisher et al., 2009) (I make mistakes on easy questions or put answers in the wrong places) (see appendix 3) therefore it is reasonable to suggest that the results in the test anxiety questionnaire will have an effect on the participants' overall test results.

Results

Table 1.

Descriptive Statistics

<i>Variable</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Std. Deviation</i>
Age	18	34	21.67	3.01
IQ	102	152	133.98	12.61
Stress	10	48	24.37	8.49
EQ	1.43	6.77	4.58	1.01
Motivation	3.40	6.33	5.06	0.57

Table 1 shows that the sample was relatively young with the mean age of 21.67 ($SD = 3.01$) with participants' ages ranging from 18 to 34. The descriptive statistics also demonstrated a high mean of IQ scores ($M = 133.98$, $SD = 12.61$) ranging from 102 to 152. The anxiety questionnaire results showed the lowest result of 10 and the highest of 48, with a mean of 24.37 ($SD = 8.49$) which according to Nist and Diehl (1990) is a healthy amount of stress. The emotional intelligence test showed a mean result of 4.58 ($SD = 1.01$) with the smallest result of 1.43 and the highest of 6.77 (highest possible result 7). The motivation questionnaire had a mean result of 5.06 ($SD = 0.57$) results ranging from 3.40 to 6.33 (highest possible result 7).

Table 2.

Descriptive Statistics

<i>Average Grades</i>	<i>Frequency</i>	<i>Percent</i>
0-39%	1	1.1
40-49%	10	10.8
50-59%	8	8.6
60-69%	20	21.5
70%+	54	58.1
Total	93	100.0

Table 2 showed that only 1 participant (1.1%) reported their average results in college between 0-39%, 10 participants (10.8%) reported an average of 40-49%, 8 participants (8.6%) reported an average of 50-59%, 20 participants (21.5%) reported an average of 60-69% and the majority, 54 participants (58.1%) reported an average of grades in college of higher than 70% suggesting that the data is not normally distributed.

Table 3.

Correlations Between Predictor Variables

	<i>Grades</i>	<i>IQ</i>	<i>Stress</i>	<i>EQ</i>
IQ	.46**		-.26*	.69
Stress	-.19	-.26**		-.51**
EQ	.08	.07	-.51**	
Motivation	.14	.02	.22*	.10

* $p \leq .05$; ** $p \leq .01$

A Pearson's correlation test was conducted to find the magnitude of the relationship between the dependent and independent variables. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity (see appendix 13). The results indicate four statistically significant correlations. IQ and grades show a medium positive correlation ($r = .46, p < .000$); a weak negative correlation between stress and IQ ($r = -.26, p = .01$); a large negative correlation between emotional intelligence and stress ($r = -.51, p < .000$); and a weak positive correlation between stress and motivation ($r = .22, p = .04$).

Table 4.

Multiple Regression

	R^2	β	t	B	SE	$CI\ 95\%$
Model	.24**					
IQ		.42**	4.34	.04	.01	.02 - .05
Stress		-.14	-1.21	-.02	.02	-.05 - .01
EQ		-.04	-.40	-.04	.11	-.26 - .18
Motivation		.17	1.74	.33	.19	-.05 - .70

** $p \leq .01$

In Table 4 a multiple regression analysis was performed to investigate the ability of IQ, EQ, test-related stress and motivation to predict academic achievement measured in

grades. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity and homoscedasticity (see appendix 10,12). The four independent variables explained 24% of variance in academic performance ($F(4, 88) = 7.01, p < .000$). The model indicated that the only predictor of academic performance was IQ ($\beta = .42, p < .000$) indicating that a higher IQ score predicts higher grades and academic performance.

Discussion

General findings

The results of the descriptive statistics in Table 1 indicate that the sample was on average of young students ($M = 21.67, SD = 3.01$), with relatively high reported IQ scores of mean 133.98 and a standard deviation of 12.61 indicating a relatively high distribution range. The results for the anxiety questionnaire also showed very spread out results, with the range of 10 to 48 (lowest possible result being 10 and highest possible result being 50), a mean of 24.37 which is a healthy amount of stress according to Nist and Diehl (1990), but a standard deviation of 8.49 indicates that many participants do not fall into this category. The emotional intelligence results showed an average EQ of 4.58 and the range between 1.43 to 6.77, which could indicate that the data has high variation, considering that the lowest possible result is 1 and highest possible result is 7, the standard deviation of 1.01 indicates however, that there is little variation from the mean in the participants' results. The motivation questionnaire also showed that on average, the participants were motivated with a mean of 5.06 ($SD = 0.57$), range from 3.40 to 6.33 (lowest possible result being 1 and highest possible result being 7). The result of Table 2 also showed that participants reported high grades in college, with the

majority (58.1%) reported average grades in college being 70% or higher, the second most frequent result (21.5%) was of an average of between 60-69%, followed by 10.8% of participants reporting an average of 40-49%, 8.6% reporting an average of 50-59% and lastly only 1.1% reported an average of 0-39% in grades. These results combined with the results from the tables in appendix 12, where it was checked for linearity and homoscedasticity, it can be concluded that the data is negatively skewed, this can be because the participants self-reported their average grades.

The results of the Pearson's correlation test in Table 3 confirm hypothesis one, IQ, EQ and motivation showed a positive correlation with academic achievement, with IQ and grades demonstrating the only statistically significant positive moderate correlation ($r = .46, p < .000$). Hypothesis 2 is also confirmed here, as the results indicate that stress results in a negative correlation not only with academic achievement, but also with IQ and EQ, while it has a positive correlation with motivation. Additionally, the results showed that the negative relationship between stress and grades was not a statistically significant result, however it was found that stress has a weak negative statistically significant relationship with IQ ($r = -.26, p = .01$) and a positive weak relationship with motivation ($r = .22, p = 0.4$), while a large negative correlation with emotional intelligence ($r = -.51, p < .000$).

The results in Table 4, a multiple regression analysis investigating the aim of this study, "what is the best predictor for academic performance between IQ, EQ, motivation and test related stress". The results showed that the model explained 24% of variance in academic performance, the only statistically significant predictor was IQ, indicating a positive relationship between the two variables suggesting that the highest one's IQ, the higher the academic achievement.

EQ

The reported positive correlation between EQ and grades in Table 3 agrees with hypothesis 1 and show support for many researchers who relate that emotional intelligence can aid academic performance (Barchard, 2003), these results are not statistically significant however, and the additional results in Table 4 disagree with many researchers who emphasized that emotional intelligence is more important and reliable in predicting academic performance compared with IQ (e.g Parker et al., 2004; Graziano et al., 2007). These results however, can be a product of the reported inaccuracy of self-report measures of emotional intelligence (Brackett and Mayer, 2003) due to participants giving socially desirable answers. Although self-report measures have shown statistically significant positive correlations with academic performance (Mayer, 2008), researchers acknowledge that self-report measures of emotional intelligence and performance tests show very distinct results, even when the self-report measures are designed to mirror performance tests (e.g Van Rooy et al., 2005). The most used emotional intelligence performance test is the Mayer-Salovey-Caruso emotional intelligence test (MSCEIT; Mayer et al., 2002) and was demonstrated to positively correlate with verbal and spatial intelligence, reasoning ability, SAT scores, academic performance, social skills and cognitive functioning among other variables (e.g Van Rooy et al., 2005; O'Connor and Little, 2003; David, 2005; Mayer et al., 2008). It was also demonstrated to predict psychological and behavioural constructs above existing measures of intelligence and personality and showed a significant positive correlation with grades even after controlling for personality and intelligence tests (e.g Gil-Olarte et al., 2006; Rivers et al., 2010). Researchers mention however, that many of these correlations are present in middle school students and high school

students, but absent in college students (Rivers et al., 2010) which poses questions about the college learning approach, and what changes are made in the academic settings from high school to result in a lack of correlations with emotional intelligence.

Many schools and universities incorporated the RULER approach to learning, which emphasizes the importance of recognizing, understanding, labelling, expressing and regulating emotions effectively (Brackett et al., 2011) and create a more positive learning atmosphere while promoting the formation of meaningful relationships and enthusiasm for learning (Brackett et al., 2010) while relating to Goleman's (1988) 5 constructs of emotional intelligence (self-awareness, self-regulation, social skill, empathy and motivation) and also the four branches of emotional intelligence from the Mayer and Salovey(1997) model (perception of emotion, use of emotion, understanding and analysing emotion, and managing emotions). These types of classrooms have reported better academic achievement in college students (Reyes et al., 2010). This approach to learning can also increase motivation by promoting enthusiasm, positive learning atmosphere, positive interaction between students and teachers and fewer reported bullying (Brackett et al., 2010) which also creates scepticism around the validity and reliability of the findings due to the uncertainty of what is the cause of higher academic achievement, emotional intelligence or other factors such as sociability, better atmosphere, enthusiasm, motivation or subsequent behaviours and psychological constructs formed due to higher emotional intelligence. Critics of emotional intelligence also emphasize that it is abstract and invalid (Mattiuzzi, 2008), some criticise it to be a desirable moral quality (Grant, 2004) while others emphasize that the correlations between emotional intelligence and other various constructs is due

to emotional intelligence tests measuring a collection of personality traits (e.g Austin, 2008; Mikolajczak et al., 2007).

Research on emotional intelligence is still scarce, there is little agreement on what emotional intelligence is, and what measure is valid and reliable to test this construct. Future research could investigate the relationship between emotional intelligence and academic performance using a performance test instead of a self-report measure of EQ. Future research could also investigate the changes in personality and motivation among other constructs after engaging in RULER learning, and further evaluate if the changes in academic achievement are due to emotional intelligence alone, or other underlying constructs. It would also be interesting to investigate the differences in school learning approaches compared to college learning approaches, and what contributes to the reported absence of correlation between academic performance and emotional intelligence in college students.

Motivation

The results in table 4 showed that motivation is not a statistically significant predictor of academic performance, which disputes with many previous findings that academic goals and motivation can be more important in academic achievement than IQ (Kitsantas et al., 2008; Meece et al., 2006).

The results in Table 3 support hypothesis 1, that motivation will have a positive association with academic performance. The results also show that motivation did not have any statistically significant correlation with any variable except stress, interestingly, motivation was also the only positive correlation associated with test related stress. Relating to the results in Table 1, it was shown that the mean for test-

related stress was a healthy amount of anxiety, which could suggest that this anxiety increases students' motivation to learn by stimulating students to achieve their goals (Linnenbrink, 2002). Further correlation analyses between individual subscales of the MSLQ and grades (see appendix 14) indicated that self-efficacy had a significant positive correlation with grades ($r = .25$, $p = .02$). These findings relate to previous research that suggests that high efficacy stimulated individuals to be more persistent in their efforts and be motivated to achieve what they believe they can achieve (Bandura, 1977; Schunk, 1990; Zimmerman, 2000; Walker et al., 2006). Self-efficacy also showed a positive statistically significant correlation with intrinsic motivation ($r = .50$, $p < .000$), task value ($r = .52$, $p < .000$) and control of learning beliefs ($r = .34$, $p = .00$), and a statistically significant negative correlation with test anxiety ($r = -.51$, $p < .000$). These findings agree with many previous research that emphasized the positive relationship between self-efficacy, motivation, cognitive strategy use and academic performance (e.g Zimmerman et al., 1992; Pintrich et al., 1990). Researchers such as Andrew and Vialle (1998) theorize that individuals that are higher in self-efficacy, are more confident in their strengths and take control of their own learning, participate more in class and prefer hand-on learning, while those with low self-efficacy tend to avoid academic interactions; while others found that self-efficacy correlated with higher effort, persistence and perseverance (Pajares, 2003; Schunk, 2003). These findings also suggest that high self-efficacy leads to lower test-related stress due to the higher belief in one's strengths, while strengthening the error-monitoring system and therefore could contribute to a higher academic performance (Fisher et al., 2009).

Another interesting observation is that while motivation and stress had a positive statistically significant correlation in Table 3, further correlation analyses between

MSLQ subscales and test-related stress questionnaire (see appendix 15) showed that the extrinsic goal orientation scale in the MSLQ was the only variable that positively correlates with both the test-related stress questionnaire ($r = .30, p = .00$) and the test anxiety subscale in the MSLQ ($r = .47, p < .00$). The findings also show a negative correlation between intrinsic motivation and stress, a low intrinsic motivation correlates with a high level of stress, while a low extrinsic motivation correlates with low test-related stress. It is reasonable to suggest that these findings and the findings previously mentioned, agree with previous researchers which suggest that there is a difference between intrinsic and extrinsic motivation. These results could infer that intrinsic motivation leads to lower levels of test-related stress due to the positive correlation with self-efficacy and therefore higher academic achievement. Researchers also mention that extrinsic motivation is not optimal for long-term improvement of academic performance, (William and Stockdale, 2004) instead, they stress that teachers should promote intrinsic motivation as it promotes interest, competence and desire to be challenged (Deci and Ryan, 2002; Reeve et al., 2003).

Future research should further investigate the relationship between intrinsic and extrinsic motivation and grades, and how intrinsically motivated students differ in their style of learning and academic interactions compared to extrinsically motivated students. Future research could also investigate the relationship between motivation and self-efficacy, while relating to theories such as the expectancy theory (Vroom, 1964) which explains why some behaviours are optimal over others, and locus of control, as it was previously shown that these concepts closely interact with each other (e.g Fisher et al., 2009).

Test-related stress

The results in Table 3 support hypothesis 2, that test-related stress negatively correlates with academic performance, meaning that the higher the anxiety the lower the grades, these results were not statistically significant however. Stress had a weak statistically significant negative correlation with IQ and a large negative statistically significant correlation with EQ, suggesting that high levels of stress can impair performance on these tasks. The results agree with previous research, that higher anxiety negatively affects performance (Elias et al., 2011; Sohail, 2013; Akgun and Ciarrochi, 2003) but the weak positive correlation between stress and motivation disagrees with many findings that state that highly motivated individuals have lower levels of test-related anxiety (Baker, 2004; Rucher, 2012). Further analyses investigating the correlation between the subscales of motivation and the test-related anxiety questionnaire (see appendix 15) revealed that only the extrinsic motivation subscale positively correlated with anxiety ($r = .30, p = .00$), while all other subscales had a negative correlation with test-related anxiety. Self-efficacy revealed the most significant negative correlation with stress ($r = .51, p < .000$) suggesting that high self-efficacy correlates with lower levels of stress (Fisher et al., 2009). Previous research suggests that these results are because higher self-efficacy leads to better perception about one's own ability which subsequently leads to lower levels of stress (Zimmerman, 2000; Walker et al., 2006; Au, 2015; Whyte, 1979). These findings should further be investigated in relation to locus of control and error-monitoring system as previous research found that high self-efficacy is closely related to an internal locus of control and an active error-monitoring system and vice versa (Fisher et al., 2009; Au, 2015; Walker et al., 2006) suggesting that an interplay between these factors can affect academic achievement. As academic

achievement is usually measured by graded tests or exams, future research could investigate the relationship between these variables to further understand and expand the knowledge on the association between test-related stress and academic achievement and possibly ameliorate academic achievement through decreasing test-related stress (Elias et al., 2011; Akgun and Ciarrochi, 2003; Sohail, 2013).

IQ

The results in Table 3 showed that IQ was the only variable that had a medium positive statistically significant correlation with grades, suggesting that these variables are associated, the higher someone's IQ, the higher the probability that they will have a higher academic performance, agreeing with hypothesis one. IQ and stress also showed a weak negative statistically significant correlation, suggesting that higher test-related stress can impair performance on IQ tests. IQ also showed to be the only statistically significant variable that positively predicts academic achievement in Table 4, answering the research question, that IQ is the most reliable variable that predicts academic achievement between IQ, EQ, motivation and test-related stress.

These results agree not only with an abundant amount of research which shows that academic performance and IQ are related (e.g Frey and Detterman, 2004; Ceci, 1991; Stumm et al., 2011) but also with traditional views that individuals who score highly on IQ tests are more likely to outperform others in academic settings. Most researchers agree that a combination of a high IQ and quality education can predict various factors such as success, social status, morbidity and mortality, mental health, criminality and conduct disorders, resilience and mating success (e.g. Jokela et al., 2009; Gottfredson and Deary, 2004; Greengross and Miller, 2011; Stattin et al., 1993). Although this

relationship is well established, it is still widely critiqued by researchers and theorists for various reasons. One of these reasons is the argument that there is no empirical definition of what intelligence is, and the scholastic interpretation of intelligence is very one-sided (Svensson, 1971). Researchers such as Gardner and Hatch (1989) mention that most academic and IQ tests only address linguistic, logical and spatial intelligence. This was also evident in the IQ test conducted in this experiment, the participants were evaluated on their arithmetic, visual and spatial intelligence, verbal and vocabulary, abstract reasoning and general knowledge. Another critique of the standardized tests is that they emphasize memory rather than thinking and problem solving (Sternberg, 1998), many researchers agree with this statement, expressing their findings that working memory is a more powerful predictor of academic success compared to IQ (e.g Alloway and Alloway, 2010; Rogers et al., 2011; Bull et al., 2008; Gropper and Tannock, 2009). Others also demonstrated that practicing working memory exercises showed to significantly improve scores on matrix tests (Jaeggi et al., 2010; Feiyue et al., 2009). Counter arguments of these statements stress that memory is an underlying factor of intelligence, stating that crystallized intelligence deals with one's general knowledge of the world, and therefore often involves long-term memory (e.g Cattell, 1971; Jaeggi et al., 2008; Geary, 2005). These statements pose further questions on whether IQ tests and academic tests are distinct, as it was shown that they measure the same concepts such as memory, arithmetic, spatial intelligence and linguistics. Future research could focus on further investigating the concept of intelligence while focusing on these underlying concepts as well as memory, genetics and neurological differences and their impact on intelligence tests. Research could also further investigate Sternberg's triarchic theory of intelligence (Sternberg, 1985) as it was shown that students tend to perform

better when their triarchic ability pattern was matched, and was shown to effectively identify and assess achievement in gifted students (Sternberg, 1996, 1995; Grigorenko et al., 2002), helping students identify what areas of intelligence are less developed (Meeker, 1969). Further research in this area could show to be beneficial to give insight to students, teachers and parents about one's abilities and deficits, and aid students' intellectual development.

Although the relationship between academic achievement and IQ was extensively studied over the decades, there are still many unanswered questions. There is a wide disagreement on the definition, measurement and predictors of intelligence. While some researchers agree with the association between academic achievement and IQ, many suggest that academic achievement and intelligence is something beyond IQ (e.g Weinbern, 1989). While this research demonstrated the positive correlation between academic achievement and IQ, it is still unclear whether this is because they measure intelligence, or due to the correlation between other measured concepts such as memory, spatial knowledge, mathematical skills and linguistics that causes this relationship.

Conclusion

The aim of this research was to investigate the predictors of academic performance between IQ, EQ, motivation and test-related stress. The research also included two hypotheses: 1. That IQ, EQ, and Motivation will positively correlate with academic performance; 2. That test-related stress will negatively correlate with academic performance. Although not all relationships were statistically significant, both hypotheses were supported.

A multiple regression analysis revealed that the model explained 24% of variance in academic performance, with IQ being the only statistically significant predictor. These findings suggest that those with higher IQ scores are more likely to outperform individuals with lower IQ scores in academic settings. A Pearson's correlation test was also conducted to investigate the magnitude of the relationship between the dependent and independent variables and revealed that while grades and IQ showed the only statistically significant moderate correlation, many variables intercorrelated. Stress showed a weak negative statistically significant correlation with IQ, suggesting that higher levels of stress can impair performance on IQ tests, this relationship however, was not reported between stress and grades. It can therefore be concluded that while IQ and scholastic tests measure similar concepts such as arithmetic, linguistics and spatial intelligence, they have some distinctive qualities. These results agree with previous research that suggest that IQ and academic performance have a positive relationship with one another (Frey and Detterman, 2004; Ceci, 1991; Stumm et al., 2011) such research also emphasize that a combination of a high IQ and quality education can predict various factors such as future success, social status, morbidity and mortality, mental health, criminality and conduct disorders, resilience and mating success among others (Jokela et al., 2009; Gottfredson and Deary, 2004; Greengross and Miller, 2011, Stattin et al., 1993). These findings could suggest that exercising tasks that are present in IQ tests can increase one's IQ score, and subsequently their academic performance. Researchers still must investigate these hypotheses however, as well as investigate if IQ scores are innate, or if they can be changed.

Future research should investigate the predictors of IQ as well as further research the predictors of academic performance to aid students in improving their academic

achievement. Some researchers believe that memory plays an important role in IQ tests (Sternberg, 1998) and many demonstrated that practicing working memory exercises can significantly improve scores on matrix tests (Jaeggi et al., 2010; Feiyue et al., 2009). Many researchers believe that these results are because crystallized intelligence deals with one's general knowledge of the world and often involves memory, making it an underlying factor of intelligence (Cattell, 1971; Jaeggi et al., 2008; Geary, 2005). Future research could also investigate other ways of testing intelligence, as many of the present tests are often criticised for evaluating concepts such as spatial knowledge, mathematics, linguistics and memory which are not necessarily intelligence. As most measurements of intelligence including scholastic performance are evaluated through tests, some question whether improvements in such areas mentioned earlier also show improvements in results due to intelligence enhancements or due to successful test taking.

Motivation showed interesting relationships with some variables, it did not show to be a statistically significant predictor of academic performance but showed a positive statistically significant correlation with stress, further correlational analyses revealed though provoking results. A Pearson's correlation test was conducted to investigate the relationship between individual subscales of the motivation questionnaire (MSLQ) and grades. It was found that while the overall motivation results positively correlated with stress, extrinsic motivation scale was the only subscale that positively correlated with stress, this could suggest that the participants were on average more extrinsically motivated. These findings also support previous research which emphasize the differences between intrinsic and extrinsic motivation. Additionally, it was found that self-efficacy had a significant positive correlation with grades, intrinsic motivation, task

value and control of learning beliefs, and a statistically negative correlation with test-related stress. Agreeing with previous research (e.g Zimmerman et al., 1992; Pintrich et al., 1990; Schunk, 2003) it can be deduced that individuals who have higher beliefs in their strengths show higher levels of intrinsic motivation and reduced levels of test-related stress. Previous research emphasizes the importance of intrinsically motivated students and high self-efficacy due to the positive relationship between these factors and academic performance (Zimmerman et al., 1992; Pintrich et al., 1990; William and Stockdale, 2004). Future research should further investigate the differences between intrinsic and extrinsic motivation in relation to academic achievement, and the relationship between self-efficacy and academic achievement. Findings in this area would be infinitely beneficial to identify motivational factors that contribute to better academic achievement. Researchers mention that these differences are due to intrinsically motivated students have a higher self-efficacy which leads to persistence, perseverance and participation in class, they tend to take control of their own learning and show higher efforts (Andrew and Vialle, 1998; Pajares, 2003; Schunk, 2003). Fisher and colleagues (2009) also mention that higher self-efficacy and intrinsic motivation contributes to lower mistakes in tests and therefore a higher academic performance. Although researchers should further investigate these claims, such findings could give students, teachers and parents insight about promoting intrinsic motivation and self-efficacy to subsequently improve academic performance. These findings combined with the findings of the relationship between academic performance and stress, self-efficacy and the predictive relationship between IQ and academic performance can give insight about how one can improve their academic performance.

Limitations

Although this research was carefully prepared to reach its aims, there were some unavoidable limitations. Due to resource constraints, the participants were not provided with an official IQ test, instead, an online version was used which may lack validity and reliability. The questionnaire evaluated various areas of intelligence which are present in IQ tests, including arithmetic, spatial and visual imagery, general knowledge, abstract reasoning and vocabulary. Although researchers found that the types of intelligence skills evaluated in this test have positive correlations with test performance and academic achievement (Kulp, 1999; Kurtz, 1980; Chamorro-Premuzic and Furnham, 2006), it is important that future research investigates the relationship between IQ and academic performance using official IQ tests.

Similarly, a self-report measure of emotional intelligence (TEIQue-SF) was used in this research. This measure showed to have validity, reliability, internal consistency and good psychometric properties at global level (Petrides and Furnham, 2006; Cooper and Petrides, 2010; Petrides, 2009) and showed to predict various concepts such as pro-social behaviour, job control, job satisfaction, psychological wellbeing, happiness and empathy deficits in psychopathy, anxiety and personality dimensions among other factors (Furnham and Petrides, 2003; Ali et al., 2009; Petrides and Furnham, 2006). However, some researchers argue that self-report measures and performance tests of emotional intelligence show very distinct results, even when self-report measures are designed to mirror performance tests (Van Rooy et al., 2005; Mayer et al., 2002). Future research could investigate these claims by comparing performance tests and self-report measures of intelligence with academic performance.

Appendix 12 also showed that the data was negatively skewed for reported grades, with more than half of the participants reporting their average grades to be more than 70%. This issue could be due to skewed distribution of participants, or it could be because the grades were self-reported. Future research could avoid this limitation by retrieving the participants' transcripts and calculating their average scores. This limitation could also be a result of an opportunistic sampling technique. Future research should consider using probabilistic sampling techniques.

This research also did not consider memory, genetics, personality and other factors which could contribute to a relationship with academic achievement due to time and resource constraints. Future research could further investigate the predictors of academic achievement and its relationship with intelligence by including neurological and genetic factors.

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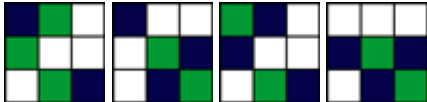
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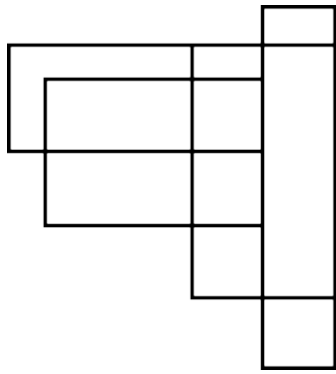
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Appendices

Appendix 1.

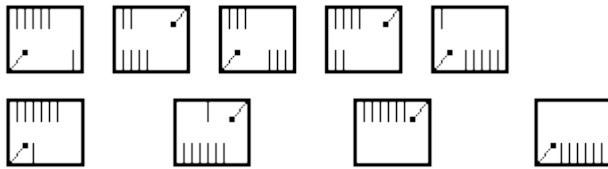
IQ test

- Which one of the five is least like the other four?
Dog Mouse Lion Snake Elephant
- Which number should come next in the series? 1 - 1 - 2 - 3 - 5 - 8 - 13
8 13 21 26 31
- Which one of the five choices makes the best comparison? PEACH is to HCAEP as 46251 is to:
25641 26451 12654 51462 15264
- Mary, who is sixteen years old, is four times as old as her brother. How old will Mary be when she is twice as old as her brother?
20 24 25 26 28
- Which larger shape would be made if the two sections are fitted together?


- Which one of the numbers does not belong in the following series? 2 - 3 - 6 - 7 - 8 - 14 - 15 - 30
THREE SEVEN EIGHT FIFTEEN THIRTY
- Which one of the five choices makes the best comparison? Finger is to Hand as Leaf is to:
Twig Tree Branch Blossom Bark
- If you rearrange the letters "CIFAIPC" you would have the name of a(n):
City Animal Ocean River Country
- Choose the number that is $\frac{1}{4}$ of $\frac{1}{2}$ of $\frac{1}{5}$ of 200:
2 5 10 25 50
- John needs 13 bottles of water from the store. John can only carry 3 at a time. What's the minimum number of trips John needs to make to the store?
3 4 $4\frac{1}{2}$ 5 6
- If all Bloops are Razzies and all Razzies are Lazzies, all Bloops are definitely Lazzies?
True False
- Choose the word most similar to "Trustworthy":
Resolute Tenacity Relevant Insolent Reliable
- If you rearrange the letters "LNGEDNA" you have the name of a(n):
Animal Country State City Ocean
- Which one of the numbers does not belong in the following series? 1 - 2 - 5 - 10 - 13 - 26 - 29 - 48
1 5 26 29 48
- Ralph likes 25 but not 24; he likes 400 but not 300; he likes 144 but not 145. Which does he like: 10 50 124 200 1600
- How many four-sided figures appear in the diagram below?

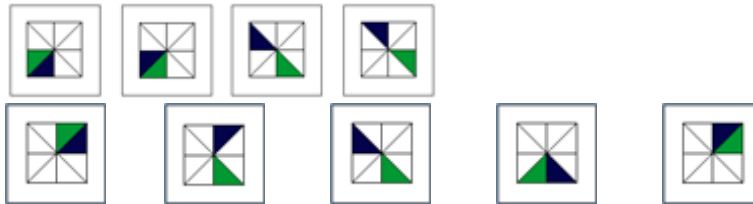


10 16 22 25 28

17. What is the missing number in the sequence shown below? 1 - 8 - 27 - ? - 125 - 216
36 45 46 64 99
18. Which one of the following things is the least like the others?
Poem Novel Painting Statue Flower
19. Which of the figures below the line of drawings best completes the series?



20. Which of the figures below the line of drawings best completes the series?



Appendix 2.

Trait Emotional Intelligence Questionnaire (Short Form) (Petrides and Furnham, 2006)

TEIQue-SF

Instructions: Please answer each statement below by putting a circle around the number that best reflects your degree of agreement or disagreement with that statement. Do not think too long about the exact meaning of the statements. Work quickly and try to answer as accurately as possible. There are no right or wrong answers. There are seven possible responses to each statement ranging from 'Completely Disagree' (number 1) to 'Completely Agree' (number 7).

1 2 3 4 5 6 7

Completely Disagree

Completely Agree

1. Expressing my emotions with words is not a problem for me.
2. I often find it difficult to see things from another person's viewpoint.
3. On the whole, I'm a highly motivated person.
4. I usually find it difficult to regulate my emotions.
5. I generally don't find life enjoyable.
6. I can deal effectively with people.
7. I tend to change my mind frequently.
8. Many times, I can't figure out what emotion I'm feeling.
9. I feel that I have a number of good qualities.
10. I often find it difficult to stand up for my rights.

11. I'm usually able to influence the way other people feel.
12. On the whole, I have a gloomy perspective on most things.
13. Those close to me often complain that I don't treat them right.
14. I often find it difficult to adjust my life according to the circumstances.
15. On the whole, I'm able to deal with stress.
16. I often find it difficult to show my affection to those close to me.
17. I'm normally able to "get into someone's shoes" and experience their emotions.
18. I normally find it difficult to keep myself motivated.
19. I'm usually able to find ways to control my emotions when I want to.
20. On the whole, I'm pleased with my life.
21. I would describe myself as a good negotiator.
22. I tend to get involved in things I later wish I could get out of.
23. I often pause and think about my feelings.
24. I believe I'm full of personal strengths.
25. I tend to "back down" even if I know I'm right.
26. I don't seem to have any power at all over other people's feelings.
27. I generally believe that things will work out fine in my life.
28. I find it difficult to bond well even with those close to me.
29. Generally, I'm able to adapt to new environments.
30. Others admire me for being relaxed.

Appendix 3.

Motivated strategies for learning questionnaire (Pintrich et al., 1991)

Part A. Motivation

1 – not at all true of me

7 – very true of me

1. In a class like this, I prefer course material that really challenges me so I can learn new things.
2. If I study in appropriate ways, then I will be able to learn the material in this course.
3. When I take a test I think about how poorly I am doing compared with other students.
4. I think I will be able to use what I learn in this course in other courses.
5. I believe I will receive an excellent grade in this class.
6. I'm certain I can understand the most difficult material presented in the readings for this course.
7. Getting a good grade in this class is the most satisfying thing for me right now.
8. When I take a test I think about items on other parts of the test I can't answer.
9. It is my own fault if I don't learn the material in this course.
10. It is important for me to learn the course material in this class.
11. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.
12. I'm confident I can learn the basic concepts taught in this course.
13. If I can, I want to get better grades in this class than most of the other students.
14. When I take tests I think of the consequences of failing.
15. I'm confident I can understand the most complex material presented by the instructor in this course.
16. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.
17. I am very interested in the content area of this course.
18. If I try hard enough, then I will understand the course material.
19. I have an uneasy, upset feeling when I take an exam.
20. I'm confident I can do an excellent job on the assignments and tests in this course.
21. I expect to do well in this class.
22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.
23. I think the course material in this class is useful for me to learn.

24. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.
25. If I don't understand the course material, it is because I didn't try hard enough.
26. I like the subject matter of this course.
27. Understanding the subject matter of this course is very important to me.
28. I feel my heart beating fast when I take an exam.
29. I'm certain I can master the skills being taught in this class.
30. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.
31. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.

Appendix 4.

Test Anxiety Questionnaire (Nist and Diehl, 1990)

Never – 1 Rarely – 2 Half-time – 3 Often – 4 Always – 5

___ I have visible signs of nervousness such as sweaty palms, shaky hands, and so on right before a test.

___ I have "butterflies" in my stomach before a test.

___ I feel nauseated before a test.

___ I read through the test and feel that I do not know any of the answers.

___ I panic before and during a test.

___ My mind goes blank during a test.

___ I remember the information that I blanked on once I get out of the testing situation.

___ I have trouble sleeping the night before a test.

___ I make mistakes on easy questions or put answers in the wrong places.

___ I have difficulty choosing answers.

Appendix 5. Introduction to questionnaire

Correlates of Grades between intelligence, motivation and anxiety

You are asked to participate in a questionnaire as part of the BA Hons Psychology Degree thesis. You are asked to take part in four questionnaires: A general intelligence questionnaire, to determine your IQ score; an EQ test to determine your emotional intelligence score; a motivation questionnaire which will evaluate your motivation and attitudes; and a test anxiety questionnaire to determine your degree of stress when taking academic tests. You will also be asked to provide your average grade score for

one year of study, this is needed to be later correlated with the results of the previously mentioned questionnaires.

start

press ENTER

Appendix 6. Consent form

This research aims to investigate the relationship between academic success and intelligence, and determine what is the best predictor of intelligence through correlating the scores in an IQ test, EQ test, motivation and test-related stress questionnaires with grades.*

By clicking accept you understand the following terms: 1) Your participation in this study is voluntary. 2) The data we collect do not contain any personal information about you. These results will later be used in presentations, dissemination, and will be provided for examination, your personal details will not be disclosed during these procedures. 3) You will be asked to provide your general test scores for the previous academic year.

• Y

I accept

• N

I don't accept

Appendix 7. Introduction to Motivation Questionnaire

The following questions ask about your motivation for and attitudes about your college experience. Remember there are no right or wrong answers, just answer as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of you, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you. There are 31 questions.

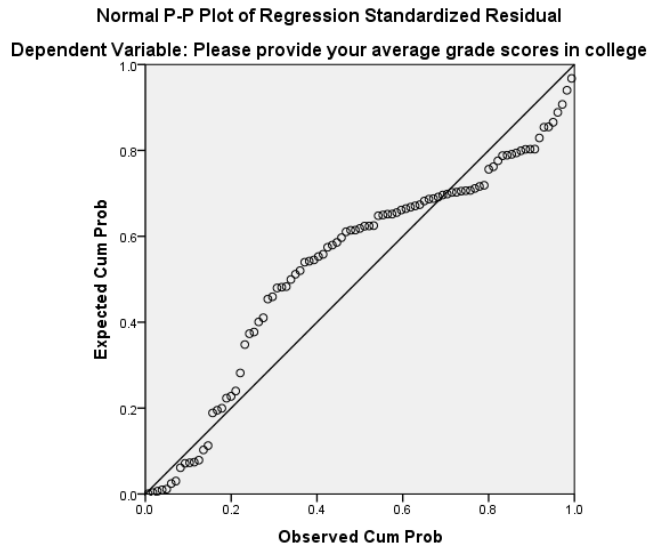
Appendix 8. Introduction to EQ Questionnaire

The following questionnaire is an EQ test. Please answer each statement below by selecting the number that best reflects your degree of agreement or disagreement with that statement. Do not think too long about the exact meaning of the statements. Work quickly and try to answer as accurately as possible. There are no right or wrong answers. There are seven possible responses to each statement ranging from 'Completely Disagree' (number 1) to 'Completely Agree' (number 7). There are 30 questions.

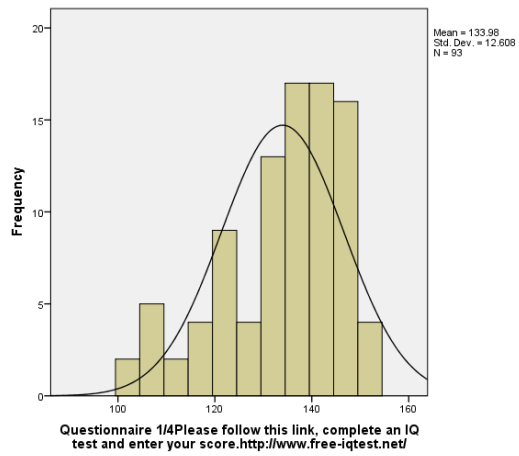
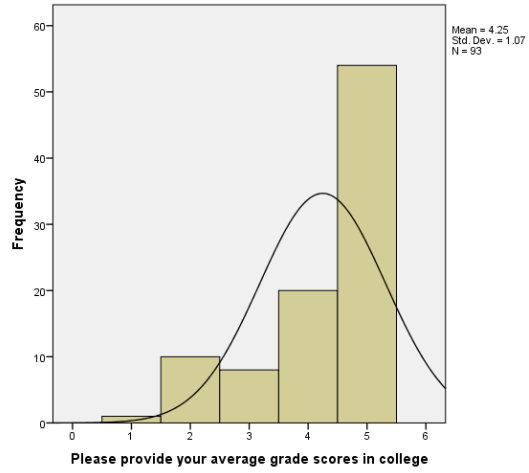
Appendix 9. Introduction to Stress Questionnaire

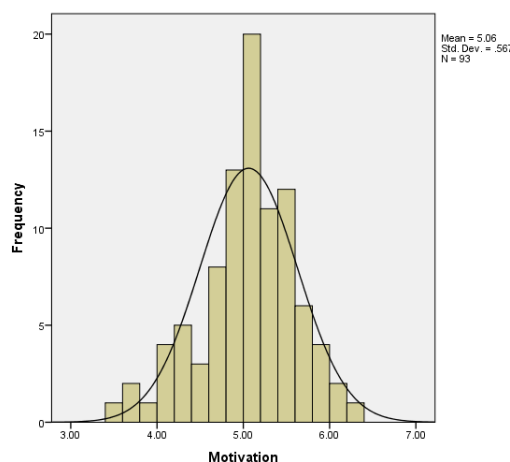
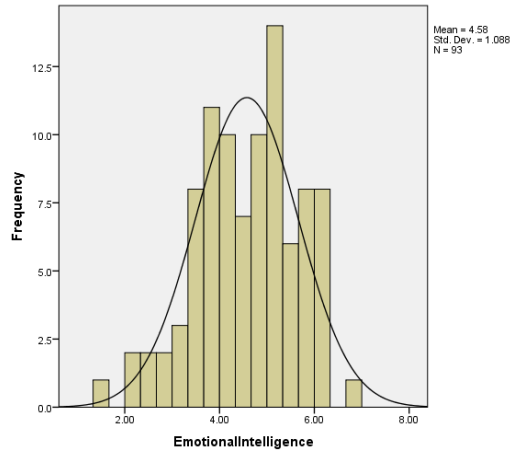
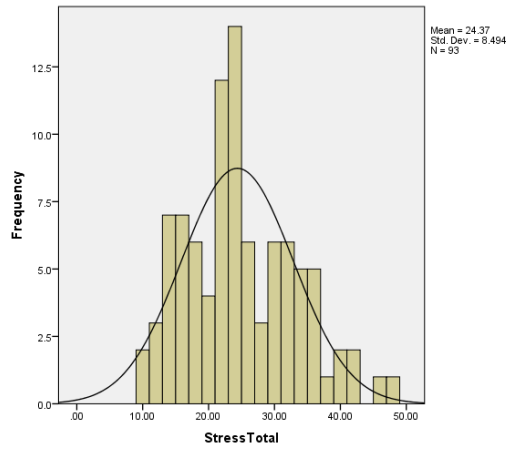
This last questionnaire is a 10 items test anxiety questionnaire. Please answer as accurately as possible from 1. Never to 5. Always.

Appendix 10. PP Plot

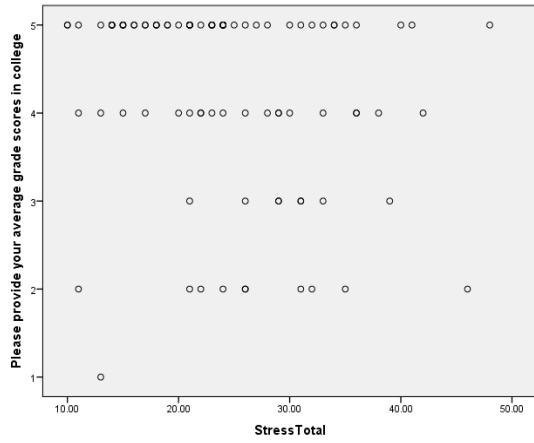
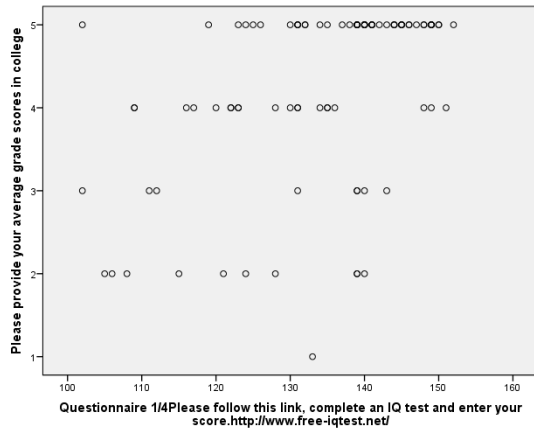


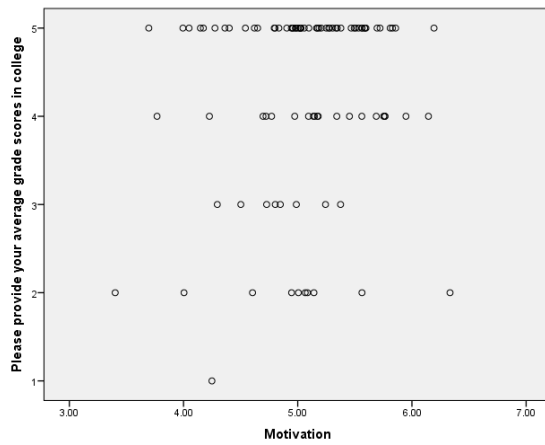
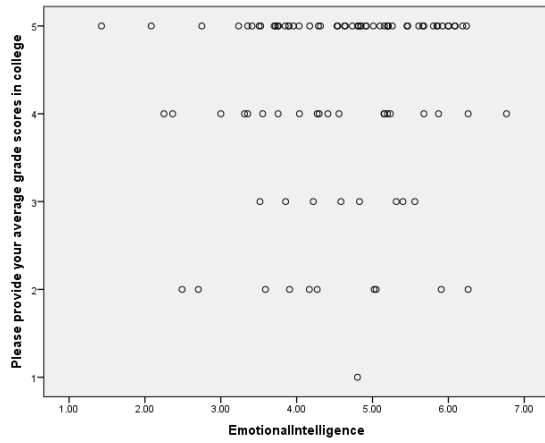
Appendix 11. Frequency Tables





Appendix 12. Scatter Plots





Appendix 13.

Pearson Correlation Test Between MSLQ subscales

	Grades	Intrinsic	Extrinsic	Task Value	Beliefs	Self-efficacy	Test Anxiety
Grades		.10	.04	.16	.06	.25*	-.08
Intrinsic Goal Orientation	.10		-.06	.58**	.13	.50**	-.25*
Extrinsic Goal Orientation	.04	-.06		.12	.14	-.12	.47**
Task Value	.16	.58**	.12		.30*	.52**	-.19
Control of Learning Beliefs	.06	.134	.14	.29**		.34**	-.06
Self-Efficacy	.25*	.50**	-.12	.52**	.34**		-.51**
Test Anxiety	-.07	-.25*	.47**	-.19	-.06	-.51**	

* $P \leq .05$; ** $p \leq .01$

Appendix 14.

Pearson Correlation Test Between MSLQ subscales and test-related stress questionnaire

	Intrinsic	Extrinsic	Task Value	Control of Beliefs	Self-efficacy	Test anxiety	Stress questionnaire
Intrinsic		-.06	.58**	.13	.50**	-.25*	-.15
Extrinsic	-.06		.12	.14	-.12	.47**	.30**
Task Value	.58**	.12		.29**	.52**	-.19	-.21*
Control of Beliefs	.13	.14	.29**		.34**	-.06	-.13
Self-efficacy	.50**	-.12	.52**	.34**		-.51**	-.51**
Test-anxiety	-.25*	.47**	-.19	-.06	-.51**		.77**
Stress questionnaire	-.15	.30**	-.21*	-.13	-.51**	.77**	

* $p \leq .05$; ** $p \leq .01$

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