# An in-depth look at scholastic success: Fluid intelligence, personality traits or emotional intelligence?

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## ARTICLE INFO

## ABSTRACT

The aim of the present study was to take an in-depth look at the role of fluid intelligence, personality traits and emotional intelligence (both ability-based and self-reported) in predicting scholastic success, verifying the existence of incremental validity of emotional intelligence with respect to fluid intelligence and personality variables. One hundred twenty-four students attending the last two years of high school were administered: the Advanced Progressive Matrices, the Eysenck Personality Questionnaire Revised Short Form, the Mayer-Salovey-Caruso Emotional Intelligence Test, the Bar-On Emotional Quotient Inventory: Short. The results demonstrate the influence exercised by fluid intelligence, personality and emotional intelligence on scholastic success, underlining, in particular, the role of emotional intelligence defined according to the ability-based model.

## 1. Introduction

From an analysis of the literature, the role of intelligence in understanding scholastic success appears to be solid. Numerous studies have demonstrated how intelligence is a predictor of successful performance (Busato, Prins, Elshout, & Hamaker, 2000; Farsides & Woodfield, 2003; Harris, 1940; Mouw & Khanna, 1993; Neisser et al., 1996).

In the literature, the role of personality traits in relation to scholastic success has been traditionally studied (Cattell & Butcher, 1968; Eysenck & Eysenck, 1985; Kline & Gale, 1971). The relationship that ties Extraversion to scholastic success is nonetheless complex, as some studies have found no significant relationships (Furnham & Mitchell, 1991; Halamandaris & Power, 1999; Heaven, Mak, Barry, & Ciarrochi, 2002). Moreover, several studies have found contradictory results, as some variable criteria suggest a positive relationship with Extraversion, for example verbal ability is positively associated with Extraversion (Chamorro-Premuzic, Furnham, & Petrides, 2006), while other variable criteria show no relationship at all (Goff & Ackerman, 1992; Rothstein, Paunonen, Rush, & King, 1994).

It emerged that Neuroticism is associated to lower scholastic success, particularly at a university level (Ackerman & Heggestad, 1997; De Raad & Schouwenburg, 1996) and those that obtain higher scores on the Neuroticism dimension tend to repeat their final exam more times before successfully completing their studies (De Fruyt & Mervielde, 1996). Moreover, Neuroticism is negatively associated with verbal ability (Chamorro-Premuzic et al., 2006).

Psychoticism appears to be the best inverse predictor of academic seminar outcome, in that those that obtain higher scores on the Psychoticism trait seem to possess less motivation, less habit to study and lower oral expression skills (Furnham & Medhurst, 1995). Moreover, Caution (low Psychoticism) is negatively associated with numerical ability (Chamorro-Premuzic et al., 2006). Heaven et al. (2002) also demonstrated that a lower level of Psychoticism is a consistent predictor of academic performance.

Notwithstanding the presence in the literature of studies that have investigated the relationship between scholastic success and both intelligence and personality, in agreement with Lounsbury, Sundstrom, Loveland, and Gibson (2003), it is striking that there are just a few studies that have examined the incremental validity of the personality variables with respect to cognitive variables in predicting scholastic performance, as for example Brown (1994), Roessler (1978), Wolfe and Johnson (1995) and, recently, Di Fabio and Busoni (2007), Furnham and Chamorro-Premuzic (2004), Furnham, Chamorro-Premuzic, and McDougall (2003).

An area of recent interest in scholastic success regards the role that the emotional intelligence construct plays. Petrides, Frederickson, and Furnham (2004) show how emotional intelligence influences the relationship between academic performance and cognitive ability. In a longitudinal study on the transition from high school to university, Parker, Summerfeldt, Hogan, and Majeski (2004), referring to the emotional intelligence model by Bar-On (2002), show that three emotional intelligence dimensions are

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significant predictors, although slight, of academic success. In a study conducted on a sample of high school students (Parker et al., 2004), emotional intelligence turns out to be a predictor of scholastic success as defined in terms of the end of year GPA. Taken together, these studies support the existence of a relationship between the emotional intelligence construct and scholastic success. In addition, the study by Van der Zee, Thijs, and Schakel (2002) supports the incremental validity of both self and other ratings of emotional intelligence in predicting success in academic and social life above traditional measures of academic intelligence and personality. The debate in the literature is still controversial as underlined by Amelang and Steinmayr (2006); furthermore, the study by Van der Zee et al. (2002) reported that the measures of trait emotional intelligence were still related to success criteria (academic and social success) after controlling for personality and intelligence measures.

In recent years, a debate has begun questioning the adequacy of self-report measures to demonstrate the emotional intelligence construct. Some authors (Mayer, Caruso, & Salovey, 1999; Mayer & Salovey, 1997) maintained that emotional intelligence can be defined more accurately as a skill rather than a conglomeration of personal traits and characteristics. Mayer and Salovey (1997) presented a model that considers emotional intelligence a form of intelligence tied to the process of elaboration of information. The authors constructed the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT, Mayer, Salovey, & Caruso, 2002), an instrument to specifically measure ability-based emotional intelligence. From a conceptual point of view, it appears understandable that ability-based emotional intelligence based on competency in accomplishing tasks, in this case of an emotional nature, can be a highly efficacious predictor of scholastic success, defined in terms of GPA, compared to self-reported emotional intelligence (O'Connor & Little, 2003) that refers to different aspects of personal functioning. Nevertheless, in the literature, there is a great debate about the validity of ability-based measures. One of the principal criticisms that Brody (2004) has of the MSCEIT, for example, is that it does not furnish empirical evidence on incremental predictive validity over standard measures of intelligence and personality for important socially relevant outcomes.

The growing interest in the emotional intelligence construct is nevertheless due to the attempt to verify if the introduction of this new variable provides an explanation for the percentage of incremental variance with respect to intelligence and personality (Fox & Spector, 2000; Van der Zee et al., 2002). Interest in emotional intelligence originated from the fact that, while personality characteristics are considered essentially stable, a strong consensus in the literature exists relative to the fact that emotional intelligence is an implementable characteristic or competence (Bar-On, 2002; Mayer et al., 2002).

The present study aims to take a more in-depth look at the role of fluid intelligence, personality traits and emotional intelligence (both ability-based and self-reported) to explain scholastic success in a sample of students attending the last two years of high school, verifying the existence of incremental validity of the emotional intelligence compared to fluid intelligence and personality variables. The sample choice was determined by the desire to take a more in-depth look at the topic with regard to secondary school, in that scholastic success in this context, within the framework of the research, does not appear to be as adequately studied as academic success. The choice of the grade point average (GPA) as a variable criterion involves some considerations. Although the GPA could in itself be a trap tied to variability in grading on the part of the teachers, it however represents a valid criterion as it is a comprehensive measure of grades received in different subjects, thus able to dilute the tendency toward grade distortion on the part of the teachers (Lounsbury et al., 2003). At present, its

use can guarantee a higher level of comparability of the results with other studies.

The hypotheses are as follows:

- (H1) fluid intelligence will correlate positively with scholastic success (Busato et al., 2000; Furnham & Chamorro-Premuzic, 2004; Harris, 1940; Lounsbury et al., 2003; Neisser et al., 1996);
- (H2) in relation to scholastic success, the dimensions of personality will be able to add a percentage of incremental variance compared to the variance explained by fluid intelligence (Di Fabio & Busoni, 2007; Furnham & Chamorro-Premuzic, 2004; Furnham et al., 2003; Lounsbury et al., 2003);
- (H3) in relation to scholastic success, emotional intelligence, both ability-based and self-reported, will be able to add a percentage of incremental variance compared to the variance explained by fluid intelligence and personality (Van der Zee et al., 2002);
- (H4) in relation to scholastic success, ability-based emotional intelligence will explain a greater percentage of incremental variance compared to self-reported emotional intelligence (O'Connor & Little, 2003).

## 2. Method

### 2.1. Participants

The sample was composed of 124 students enrolled in the last two years of high school in a school system located in a Tuscan province. The participants consisted of 34 males (27.4%) and 90 females (72.6%; 61 students in their fourth year and 63 students in their fifth year). The age of the participants ranged between 16 and 20 years ($M = 17.49$, SD = .66).

### 2.2. Measures

To evaluate fluid intelligence, the Advanced Progressive Matrices (APM) test by Raven (1962), which measures non-verbal intellectual efficiency and the subject's general capacity of observation and clear thinking, was used. The test is sub-divided into 2 series of reactives, composed respectively of 12 (Series I) and 36 (Series II) items, on which the subject must indicate only one exact response from among 8 possible alternatives. The first series was used as a short reactive training, while the second series was used as an efficiency test. With regard to reliability, Cronbach's alpha was .91.

To evaluate personality traits, the Eysenck Personality Questionnaire Revised Short Form (EPQ-RS, Eysenck, Eysenck, & Barrett, 1985) in the Italian version by Dazzi, Pedrabissi, and Santinello (2004) was used. This version is composed of 48 items, 12 for each three dimensions and 12 for the Lie scale, to which the subjects give a dichotomous response (Yes/No). The factors that compose this instrument are: Extraversion, which furnishes an index of the subject's sociability and vivacity, based on the scores obtained from the subjects, providing collocation of a continuum that ranges from extraversion to introversion (alpha: .87); Neuroticism, which describes the emotions of the person on a continuum that ranges from emotional stability to instability (alpha: .85); Psychoticism, proposed to demonstrate if and at what level behavior disturbances are present and unravel themselves, as dimensions, provides antipodes of equilibrium ranging from satisfying social adaptation towards increasing levels of anticonformism (alpha: .81).

To evaluate the ability-based emotional intelligence, the MSCEIT (Mayer et al., 2002) in the Italian version by D'Amico and Curci (in press) was used. The instrument is composed of 141 items, of which the response format varies based on the specific

function measured by each item. The MSCEIT shows, in addition to a total score, scores relative to two areas (Experiential Emotional Intelligence and Strategic Emotional Intelligence) and to four Branches: Perceiving Emotions (Branch 1), the ability to perceive emotions in oneself and others, as well as in objects, art, stories, music and other stimuli (alpha: .91); Facilitating Thought (Branch 2), the ability to generate, use and feel emotion to communicate feelings, or employ them in other cognitive processes (alpha: .79); Understanding Emotions (Branch 3), the ability to understand emotional information, how emotions combine and progress through relationship transitions and to appreciate such emotional meanings (alpha: .80); Managing Emotions (Branch 4), the ability to be open to feelings, and to modulate them in oneself and others so as to promote personal understanding and growth (alpha: .83).

To evaluate self-reported emotional intelligence, the Bar-On Emotional Quotient Inventory: Short (Bar-On EQ-i:S, Bar-On, 2002) in the Italian version by Giorgi and Di Fabio (2005) was used. This instrument is composed of 51 items with responses in a 5-point Likert's scale format (from 1 = "Very seldom or not true of me" to 5 = "Very often true of me or true of me"). The short version used in this study gives a total score (Emotional Quotient) and individual scores for the four emotional intelligence dimensions: Intrapersonal, associated to awareness of one's own emotions, strengths and weaknesses and the ability to express one's own feelings (alpha: .79); Interpersonal, tied to social consciousness and interpersonal relationships, implies knowing how to recognize the emotions, feelings, and needs of others and knowing how to establish and maintain cooperative, constructive and satisfying relationships (alpha: .79); Stress Management, the ability to adapt to stressful situations, knowing how to draw on emotions so as to use them to one's benefit (alpha: .84) and Adaptability, connected to the ability to deal flexibly with daily problems (alpha: .78).

To evaluate scholastic success, the student GPA was used. In the present study, the GPA was calculated based on the grades awarded at the end of the first quadrimester as the average score obtained on the principal subjects common at the different high schools present in Italy. These grades ranged from 1 to 10. In this sample the GPA provides adequate reliability (alpha = .81) and is distributed in a normal manner (skewness = .15; kurtosis = −.47).

### 2.3. Procedures and data analysis

The instruments were administered collectively within the classroom by specialized personnel and with respect for the law regarding privacy at a time agreed upon with the institute. The students were aware that they would receive individual feedback and that successively, upon receiving authorization from the Institute's administration, each subject's grades at the end of the first quadrimester were collected.

Descriptive statistics, Cronbach's alpha coefficients, Pearson's $r$ correlation and hierarchical regressions were applied to the data collected in the present study.

### 3. Results

The results of descriptive statistics, Cronbach's alpha coefficients and correlations between the GPA and the scores on the APM, the EPQ-RS, the MSCEIT and the Bar-On EQ-i:S are reported in Table 1.

The results of the hierarchical regression conducted, considering scholastic success (GPA) as the dependent variable and at the first step fluid intelligence, at the second step personality traits and at the third step alternatively the MSCEIT Total Score, the dimensions on the MSCEIT, the Bar-On EQ-i:S Total Score, and the dimensions on the Bar-On EQ-i:S as predictors, are reported in Table 2. At the first step, Fluid intelligence alone accounts for the 10% variance in scholastic success; when personality traits are added at the second step, the model is significant ($F = 5.07$, $p < .001$) and accounts for the 5% greater variance. When emotional intelligence is introduced at the third step, for the MSCEIT Total Score, the model is still significant ($F = 6.60$, $p < .001$) and accounts for the 7% greater variance; for the dimensions on the MSCEIT, the model is still significant ($F = 5.18$, $p < .001$) and accounts for the 12% greater variance; for the Bar-On EQ-i:S Total Score the model is still significant ($F = 5.63$, $p < .001$) and accounts for the 5% greater variance; for the dimensions on the Bar-On EQ-i:S, the model is still significant ($F = 3.76$, $p = .001$) and accounts for the 6% greater variance.

**Table 1**
Means, standard deviations, Cronbach's alpha coefficients, and correlations between grade point average, fluid intelligence, personality traits, ability-based emotional intelligence and self-reported emotional intelligence.

| | M | SD | α | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. GPA | 6.77 | .95 | .81 | – | | | | | | | | | | | | | | |
| 2. APM S2 | 18.60 | 5.60 | .88 | .32** | – | | | | | | | | | | | | | |
| 3. EPQ E | 16.36 | 2.26 | .84 | .19* | −.03 | – | | | | | | | | | | | | |
| 4. EPQ N | 18.30 | 3.37 | .82 | .02 | −.01 | −.07 | – | | | | | | | | | | | |
| 5. EPQ P | 22.28 | 1.79 | .80 | .07 | −.10 | .29** | .37** | – | | | | | | | | | | |
| 6. MSCEIT TOT | 40.81 | 4.87 | .85 | .31** | .23** | −.10 | −.08 | .01 | – | | | | | | | | | |
| 7. MSCEIT PE | 49.60 | 7.68 | .87 | .11 | .07 | −.13 | −.13 | −.08 | .79** | – | | | | | | | | |
| 8. MSCEIT FT | 40.06 | 6.70 | .80 | .28** | .22* | −.07 | −.08 | .06 | .86** | .62** | – | | | | | | | |
| 9. MSCEIT UE | 41.35 | 5.35 | .79 | .28** | .33** | −.03 | −.08 | −.04 | .70** | .38** | .45** | – | | | | | | |
| 10. MSCEIT ME | 32.06 | 5.46 | .85 | .38** | .17 | −.07 | .01 | .07 | .73** | .31** | .57** | .48** | – | | | | | |
| 11. BAR-ON TOT | 126.56 | 14.47 | .83 | .22* | .14 | −.20* | .25** | .12 | .42** | .24** | .38** | .23* | .45** | – | | | | |
| 12. INTRA | 36.29 | 6.03 | .81 | .19* | .16 | −.24** | .23** | .09 | .38** | .28** | .40** | .21* | .24** | .73** | – | | | |
| 13. INTER | 38.25 | 5.54 | .80 | .05 | .13 | −.31** | −.10 | −.15 | .41** | .28** | .30** | .26** | .45** | .67** | .32** | – | | |
| 14. STR MAN | 27.15 | 5.84 | .85 | .14 | −.01 | −.01 | .49** | .33** | .13 | −.01 | .14 | .07 | .22* | .69** | .32** | .20* | – | |
| 15. ADAPT | 24.86 | 3.94 | .79 | .24** | .08 | .08 | −.04 | .03 | .21* | .06 | .19* | .06 | .35** | .60** | .25** | .30** | .28** | – |

Note: N = 124.
GPA, grade point average; APM S2, fluid intelligence; EPQ E, Extraversion; EPQ N, Neuroticism; EPQ P, Psychoticism; MSCEIT TOT, MSCEIT Total Score; MSCEIT PE, Perceiving emotions; MSCEIT FT, Facilitating thought; MSCEIT UE, Understanding emotions; MSCEIT ME, Managing emotions; BAR-ON TOT, Bar-On EQ-i:S Total Score; INTRA, Intrapersonal; INTER, Interpersonal; STR MAN, Stress management; and ADAPT, Adaptability.
* $p < .05$.
** $p < .01$.

**Table 2**

Hierarchical regression. Dependent variable: scholastic success (GPA). Predictors: fluid intelligence, personality traits, MSCEIT Total Score, dimensions on the MSCEIT, Bar-On EQ-i:S Total Score and dimensions on the Bar-On EQ-i:S.

| | Step 1 | | Step 2 | | Step 3 | |
|---|---|---|---|---|---|---|
| | $\beta$ | $p$ | $\beta$ | $p$ | $\beta$ | $p$ |
| Fluid Intelligence | .32 | .001 | .33 | .001 | .25 | .005 |
| *Step 2* | | | | | | |
| Extraversion | | | .20 | .033 | .25 | .007 |
| Neuroticism | | | .03 | .775 | .05 | .569 |
| Psychoticism | | | .04 | .687 | −.01 | .887 |
| *Step 3* | | | | | | |
| MSCEIT Total Score | | | | | .28 | .001 |
| $R^2$ | .10 | .001 | .15 | .001 | .22 | .001 |
| $\Delta R^2$ | | | .05 | .048 | .07 | .001 |
| *Step 3* | | | | | | |
| Perceiving Emotions | | | | | −.02 | .862 |
| Facilitating Thought | | | | | .06 | .604 |
| Understanding Emotions | | | | | .05 | .622 |
| Managing Emotions | | | | | .30 | .005 |
| $R^2$ | .10 | .001 | .15 | .001 | .27 | .001 |
| $\Delta R^2$ | | | .05 | .048 | .12 | .002 |
| *Step 3* | | | | | | |
| Bar-On EQ-i:S Total Score | | | | | .23 | .010 |
| $R^2$ | .10 | .001 | .15 | .001 | .20 | .001 |
| $\Delta R^2$ | | | .05 | .048 | .05 | .010 |
| *Step 3* | | | | | | |
| Intrapersonal | | | | | .15 | .110 |
| Interpersonal | | | | | −.02 | .810 |
| Stress Management | | | | | .06 | .559 |
| Adaptability | | | | | .21 | .045 |
| $R^2$ | .10 | .001 | .15 | .001 | .21 | .001 |
| $\Delta R^2$ | | | .05 | .048 | .06 | .045 |

## 4. Discussion and conclusions

The aim of the present study was to take a more in-depth look at the role of fluid intelligence, personality traits and emotional intelligence, both ability-based and self-reported, in relation to scholastic success, verifying the existence of incremental validity of emotional intelligence with respect to fluid intelligence and personality variables, in a sample of students attending the last two years of high school.

The first hypothesis (H1) was confirmed, supporting the role played by cognitive ability in scholastic performance, analogous to findings in the literature (Busato et al., 2000; Furnham & Chamorro-Premuzic, 2004; Harris, 1940; Lounsbury et al., 2003; Neisser et al., 1996). Thus, even in this study, the influence exercised by fluid intelligence on performance seems to express itself through facilitating comprehension and learning in a scholastic context.

The second hypothesis (H2) was also confirmed, in that personality traits add an incremental variance to fluid intelligence in explaining scholastic success, expressed in terms of GPA (Di Fabio & Busoni, 2007; Furnham & Chamorro-Premuzic, 2004; Furnham et al., 2003; Lounsbury et al., 2003), supplying additional support favoring the importance of personality characteristics in predicting scholastic success.

The third hypothesis (H3) was also confirmed, in that emotional intelligence, both ability-based and self-reported, adds a percentage of incremental variance with respect to fluid intelligence and personality variables in explaining scholastic success. In line with what emerged in the study by Van der Zee et al. (2002), these results underline the role of emotional intelligence in relation to scholastic performance.

Finally, as for the last hypothesis (H4), this too was confirmed: in relation to scholastic success, ability-based emotional intelligence accounts for a percentage of incremental variance greater than self-reported emotional intelligence. In line with O'Connor

and Little (2003), ability-based emotional intelligence, conceptualized as the ability to elaborate emotions and thus closer to cognitive aspects, is more efficacious in explaining scholastic success, defined in terms of GPA, compared to self-reported emotional intelligence, defined as the perception of multiple aspects of individual functions. Furthermore, it is worth noting that the percentage of incremental variance explained by ability-based emotional intelligence is the highest compared to contributions by all the other variables, not only by personality traits but also by fluid intelligence. In particular, the Managing Emotions subscale is the best predictor of scholastic success, demonstrating how the ability to regulate emotions and facilitate emotional and intellectual growth (Mayer et al., 2002) is tied to better scholastic performance. One could deduce that the results with regard to predictors of scholastic success in the present study involve the criterion used as an index of performance, the GPA. As was recently shown in other studies (Di Fabio & Busoni, 2007), although not specifically referring to emotional intelligence, intelligence seems to most significantly influence the isolated scholastic performance, such as the score received on the State Exam, but seems to influence the GPA less. One could thus assume that, in a daily curriculum context of which the GPA expresses a measurement of the aggregate evaluation over time expressed by the teachers, the ability to regulate one's emotions is particularly profitable, specifically Managing Emotions. This branch reflects the management of emotion in the context of the individual's goals, self-knowledge and social awareness, on one hand. On the other hand, it includes abilities to avoid feelings or to reframe appraisals to reassure oneself or achieve equanimity. Finally, it includes the management of emotional relationships, which involves managing others' feelings so that a desired outcome is achieved (Mayer, Salovey, & Caruso, 2004). This branch is still operating on emotional information and it is a skill (Mayer et al., 2004), explaining the lack of correlations between the Managing Emotions subscale and Neuroticism, which seems

to highlight, even in the present study, the lack of ties, already underlined by Mayer et al. (2002), between the ability-based measures and personality traits, in that they are theoretically distinct constructs.

The results that emerged in the present study underline the role of emotional intelligence, in particular ability-based emotional intelligence, in predicting scholastic success, although it is necessary to point out some limitations of this research. A first limitation is the impossibility of generalizing the results, obtained in a specific sample of Italian students. It would be desirable to extend this study to a more representative sample of the current Italian situation and verify the results in other national contexts as well. This study presents an additional limitation tied to the use of the GPA, which could hide pitfalls tied to variability in attribution of grades by the teaching staff. As shown in the study by Di Fabio and Busoni (2007), to further the research, it might be important to carefully and simultaneously consider different indices of scholastic performance and individuate performance indicators that permit comparison of comparable results. The direction of future research could additionally regard the importance of verifying if the results emerging in the present study can be confirmed using other measures of personality that are widely diffused throughout the literature, such as those based on the Five Factor Model.

Notwithstanding the above-mentioned limitations, the results of the present study provide a more in-depth look, within an Italian context, at considerations on the relationship between scholastic success and fluid intelligence, personality traits and emotional intelligence, demonstrating in particular, the contribution of ability-based emotional intelligence. These results, if ulteriorly verified, seem to hypothesize a scenario able to broaden the possibility of psychological intervention to facilitate scholastic success, suggesting the opportunity to put into effect specific training for the development of emotional intelligence, an implementable variable (Bar-On, 2002; Mayer et al., 2002). Providing support and facilitation for the development of emotional intelligence means interventions aimed at primary prevention (Hage et al., 2007) with the objective of preparing the individual to better deal with environmental requests and to increase the ability to function in life, favoring scholastic success.

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