

The role of personality traits for academic achievement (Case Study: 412 Iranian Students)

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Abstract: The personal determinants of academic achievement and success have captured the attention of many scholars for the last decades. Among other factors, personality traits and self-efficacy beliefs have proved to be important predictors of academic achievement. The present study examines the unique contribution and the pathways through which traits and academic self-efficacy beliefs are conducive to academic achievement at the end of junior and senior high school. Participants were 412 Iranian students, 196 boys and 216 girls, ranging in age from 13 to 19 years. The hypothesized relations among the variables were tested within the framework of structural equation model. As a preliminary step, we computed the correlations between each of the Big Five at times 1 and 3, junior high-school grades at time 2, and high-school grades at time 4. The correlations were partialled for the other personality dimension in order to disentangle the unique effects of each the Big Five. Preliminary analyses showed that openness and conscientiousness were the only personality traits associated with school performance. The unique contribution of extraversion, agreeableness, and emotional stability at times 1 and 3 were not significant.

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1. Introduction

The personal determinants of academic achievement and success have captured the attention of many scholars for the last decades (Robbins et al., 2004). In particular, to identify the best predictors of scholastic performance has been a major concern of both researchers and educators aimed to value the potentials of talented students and to develop proper interventions for students at risk of academic failure. Among other factors, both personality traits and self-efficacy beliefs have proved to be important predictors of academic achievement (Bandura, Barbaranelli, Caprara, & Pastorelli, 1996; Bandura, Barbaranelli, Caprara, & Pastorelli, 2001; Britner & Pajares, 2006; Caprara, Barbaranelli, Pastorelli, & Cervone, 2004; Caprara et al., 2008; Chamorro-Premuzic & Furnham, 2003; Conard, 2006; Furnham, Chamorro-Premuzic, & McDougall, 2003; Gore, 2006; Komaraju & Karau, 2005; Marsh, Trautwein, Ludtke, Koller, & Baumert, 2006; Martin, Montgomery, & Saphian, 2006; Pajares, 2002; Pajares & Schunk, 2001; Robbins et al., 2004). Yet, most studies have addressed the contribution of personality traits and self-efficacy beliefs to academic achievement separately, as independent one from another. Exaggerations of diversities among theories and traditions in which traits and self-efficacy beliefs were rooted may lead to miss important opportunities of integration. In conceiving personality as a complex system (Caprara & Cervone, 2000), one may view at traits and at self-efficacy beliefs as both crucial to account for academic achievement, as for many other performances, although they address different structures

and processes and operate at different levels and at different distance from academic performance. Whereas traits are relatively unconditional behavioural tendencies that attest to individual's potentials in broads domain of functioning (McCrae & Costa, 1999), self-efficacy beliefs are knowledge structures that attest to the unique properties of human beings to self-reflect and learn from experience (Bandura, 1997). In this regard, prior studies have pointed to the joint contribution of basic predispositions and self-efficacy beliefs in predicting job performance (Chen, Casper, & Cortina, 2001; Kanfer, 1992; Martocchio & Judge, 1997), political participation (Caprara, Vecchione, & Schwartz, 2009), pro-social behaviour (Caprara, Alessandri, Di Giunta, Panerai, & Eisenberg, 2010), and career interest (Nauta, 2004). Ultimately, one may argue that self-efficacy beliefs may mediate, at least in part, the influence of basic traits on specific abilities and performances, by sustaining the cognitive, affective and motivational processes leading to successful performance. We consider basic traits (i.e., conscientiousness and openness) and academic self-efficacy beliefs, as layers of a hypothetic architecture of personality, in which: (i) basic traits are relatively unconditional, broad dispositions referring to what a person 'has' (level 1); (ii) and academic self-efficacy is a knowledge structure (i.e., a set self-related beliefs) operating at an intermediate level between broad dispositions and specific behaviour (Caprara et al., 2010). This reasoning echoes previous distinctions made by both McAdams' (1995) and Graziano, Jensen-Campbell, and Finch (1997) in regard

to levels of analysis, while assigning to self-efficacy a mediating role in linking basic dispositions to specific behaviours. Although our layers do not fully overlap with McAdams' (1995) levels of analysis, we share the view that individual differences in personality should be addressed at different levels, as well as the belief that a comprehensive view of personality should account for both traits and self-processes. Previous studies in education have pointed to the opportunity to address different personality constructs like traits and motivational and volitional processes (e.g., goal orientation) that can mediate the influence of traits on school performance and achievement (De Raad & Schouwenburg, 1996; Payne, Youngcourt, & Beaubien, 2007). Nonetheless, at our knowledge, any study other than the one of Caprara et al. (2004) has addressed both traits and self-efficacy beliefs in the academic domain. Peterson and Whiteman (2007) have found positive correlations between openness and academic self-efficacy in a sample of university students; however, they have explored only the associations with self-concept related to academic domain, and not with academic achievement.

According to our reasoning, in conceiving this study we argued that certain traits are crucial in fostering learning. Clearly, different traits may influence behaviour at different levels. Whereas it seems reasonable that conscientiousness would sustain self-regulative processes leading to school achievement, openness may impact more generally in fostering pupil's attitudes towards school-related matters and in enlarging epistemic motivation and cultural interests. However, both traits reflect basic differences in personality that hardly can be modelled by experience. Self-efficacy, instead, impact generally on school achievement by setting the basis for pupil's academic aspirations and by linking basic disposition to effective achievement. Yet, empirical findings capable of elucidating how traits and self-efficacy beliefs operate are needed to understand and promoting students' academic performance and success. To this aim, a longitudinal research design has been used to examine the pathways through which traits and academic self-efficacy beliefs contribute to academic performance.

2. Main body

Personality traits and academic performance Many personality researchers have argued that personality traits account for a significant portion of variance in academic performance (Chamorro-Premuzic & Furnham, 2003; Duff, Boyle, Dunleavy, & Ferguson, 2004; Furnham et al., 2003; Komarraju & Karau, 2005; Marsh et al., 2006; Martin et al., 2006). Martin et al. (2006) found that individual differences in personality played a unique role in undergraduate performance

across 4 years of coursework over and above the effects due to high-school performance and cognitive ability (i.e., achievement test scores). Chamorro-Premuzic and Furnham (2003), using two longitudinal samples of British university students, examined the relationship between personality factors and academic performance. Personality scores assessed during the first few weeks of the academic year resulted significantly associated to final exam and course work assessed 3 years later. In addition, when the predictive power of personality traits was related to both academic behaviours such as attendance and class participation and teacher's predictions, personality traits were found to account for an additional 10–17% of unique variance in academic performance. In a further study of Furnham et al. (2003), personality traits accounted for about one-fifth of the variance in exam marks and as much as one-third of the variance in essay grades for a 2-year period. Conscientiousness has been considered as the basic trait of the Big Five Model most closely linked to will to achieve (Digman, 1989). Recent meta-analysis pointed to conscientiousness as the strongest predictor of academic performance at both the secondary and tertiary levels of education, even after controlling for intelligence (Poropat, 2009). It was associated with sustained effort and goal setting (Barrick, Mount, & Strauss, 1993), both of which contribute to academic success (Steel, 2007), to compliance and concentration on homework (Trautwein, Ludtke, Schnyder, & Niggli, 2006), to time management and effort regulation in learning (Bidjerano & Dai, 2007). This is in accordance with previous findings attesting to the association of conscientiousness with course performance, class attendance, and final grades (Conard, 2006). Moreover, each specific facet of conscientiousness (e.g., diligence, dependability, self-discipline, prudence, competence, dutifulness, order, and achievement striving) was conducive to performance in academic settings, attainment of academic honors, and lower disciplinary infractions (MacCann, Duckworth, & Roberts, 2009), and independently predicted Grade.

Point Average (GPA) (Chamorro-Premuzic & Furnham, 2003; Furnham et al., 2003; Martin et al., 2006), academic motivation (Komarraju & Karau, 2005), effective learning styles (Duff et al., 2004), and academic aspirations (Rottinghaus, Lindley, Green, & Borgen, 2002). Other findings have pointed to openness as a major correlate of academic achievement and success (Asendorph & Van Aken, 2003; Blickle, 1996; De Raad & Schouwenburg, 1996; Paunonen & Ashton, 2001), effective learning style (Duff et al., 2004), and higher academic aspirations (Rottinghaus et al., 2002). Furthermore, openness has been positively associated to final school grades and to strategies that emphasize critical thinking (Bidjerano & Dai, 2007; Komarraju & Karau, 2005), approach to learning (Vermetten,

Lodewijks, & Vermunt, 2001) and learning motivation (Tempelaar, Gijselaers, Schim Van Der Loeff, & Nijhuis, 2007). Chamorro-Premuzic and Furnham (2003) found openness positively related to intelligence and intellectual curiosity. Likewise, Graziano et al. (1997) assessed the Big Five from self-reports of 5th to 8th graders and found openness positively associated with both self-report and teacher ratings of academic adjustment. Other studies have further underlined the predictive value of both conscientiousness and openness. Mervielde (1994) and Mervielde, Buyst, and De Fruyt (1995) analysed teacher ratings on different age groups (from 4 to 12 years) and found that both traits showed high correlations with academic achievement. Similar results were found by John, Caspi, Robins, Moffitt, and Stouthamer-Loeber (1994) who developed scales for the Big Five from Q-sorts of 12- to 13-year-old boys rated by their mothers. In particular, teacher reports of school performance correlated with conscientiousness and openness while verbal, performance, and full scale IQ correlated with openness. Conscientiousness and openness were the most important personality correlates of academic achievement across different informants (self, teacher, and parent) also in a study conducted by Barbaranelli, Caprara, Rabasca, and Pastorelli (2003).

Other major traits like extraversion, neuroticism, and agreeableness have shown less consistent associations with academic achievement than conscientiousness and openness. Few studies have reported a negative association between neuroticism and academic performance, but most studies have reported non-significant results (Martin et al., 2006). In reality, neuroticism fails to predict scholastic achievement over and above cognitive ability (Ridgell & Lounsbury, 2004). Extraversion has shown controversial association (i.e., positive, negative, and non-significant) with academic performance. In reality, different facets of extraversion may relate to academic success in different ways (Martin et al., 2006). Whereas agreeableness was associated with classroom behaviour (Graziano et al., 1997) and compliance with teacher instructions (Vermetten et al., 2001), its impact on academic achievement was rather small and not always consistent across samples (e.g., Poropat, 2009).

The current research is an extension of previous studies of Caprara et al. (2004, 2008) and focus on the contribution of basic traits and self efficacy beliefs to academic performance at different stages of academic career. To this aim, we examined the unique contribution of basic personality traits and academic self-efficacy beliefs on later academic performance at the end of both junior high school and high school. Then, we examined the pathways through which traits and self-efficacy beliefs were conducive to academic performance, after the contribution of socio-economic status (SES) was partialled out. Indeed, a recent

meta-analysis of Sirin (2005) showed a medium to strong relation between SES and academic performance. Taking into account SES would minimize the possibility of spurious relations due to omitted relevant variables related to SES, like quality of educational facilities and supportive relationships among parent and school (see, e.g., Caprara et al., 2008).

In accordance with previous studies, we focused on openness and conscientiousness as the most important predictors, among the Big Five, of academic achievement. Likewise, we focused on self-efficacy beliefs which in previous studies have proved to be strongly associated to academic achievement (Bandura et al., 1996). First, we expected to corroborate the independent contribution of openness and conscientiousness traits and of academic self-efficacy beliefs to academic achievement, above and beyond the contribution of SES and across gender.

Then, we expected to corroborate the crucial role of academic achievement in nurturing self-efficacy beliefs in accordance with social cognitive theory, which posits mastery experience at the roots of self-efficacy beliefs. Finally, we expected to clarify how traits and self-efficacy beliefs contribute to academic achievement at different stages of children academic career. In particular, we advanced four sets or interrelated hypotheses:

1. We expected that traits would contribute significantly to academic performance at the end of both junior and senior high school. Based on previous studies suggesting that the importance of personality traits in sustaining academic results decrease with increasing in school level (Peterson & Whiteman, 2007), we hypothesized that the contribution of traits to academic achievement is more important at earlier stage than at later stages of scholastic career, that most reflect the influence of experience.

2. In accordance with previous findings (Caprara et al., 2008) we hypothesized that academic self-efficacy beliefs contribute significantly to academic performance at the end of both junior and senior high school. Furthermore, in accordance with social cognitive theory that posits mastery experiences and self-reflection capacities at the roots of self-efficacy, we hypothesized that the contribution of academic self-efficacy beliefs to academic achievement is most relevant at later stages (secondary school) than at an earlier stages. We reasoned that students' sense of efficacy draws from previous experience and attest to their capacity to reflect and to capitalize upon experience in order to deal effectively with school challenges. Finally, school performance at the end of junior high school was expected to contribute significantly to academic self-efficacy in senior high school.

3. In accordance with above reasoning pointing to traits as potentials and to self-efficacy beliefs as

knowledge structures enabling people to make the best use of their talents, we hypothesized that openness and conscientiousness in junior high school would contribute to later academic self-efficacy beliefs. In particular, we hypothesized that beliefs students hold about their capacity to master the various school contents and to regulate their learning activities would partially mediate the effect of earlier basic dispositions towards knowledge acquisition (openness), discipline and achievement (conscientiousness) on scholastic achievement.

4. We hypothesized that economical status would influence learning at earlier stages more than at later

stages due to the selection processes that take place at end or junior high school depending on children performance. In reality, most low SES children who fail at junior high school are unlikely to continue 5 years senior high school conducive to superior education.

5. Despite a relatively large literature documents, higher levels of academic self-efficacy beliefs for females than for males (Bandura et al., 1996; Caprara et al., 2008; Pastorelli et al., 2001), there is no evidences of an influence of gender on the relations between academic self-efficacy beliefs and other personality constructs, like traits, or school

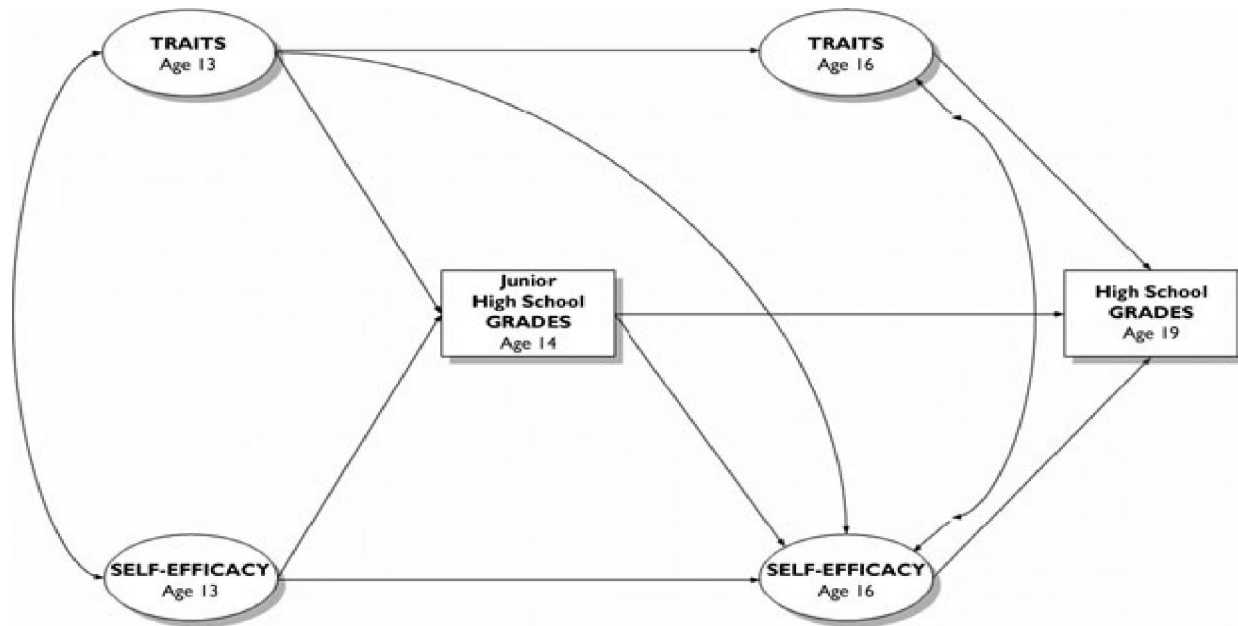


Figure 1. The posited model. The paths from socio-economic status to all other variables were omitted for sake of simplicity.

Achievement (Bandura et al., 1996; Caprara et al., 2008). Accordingly, we expected no differences between males and females in the strength of the relations among the study variables.

These hypotheses lead to posit and test a model that included (1) all the autoregressive paths; (2) the cross-lagged paths from conscientiousness and openness at the age of 13 to academic self-efficacy at the age of 16; (3) the paths from conscientiousness, openness, and academic self-efficacy beliefs at the age of 13 to junior high-school grades; (4) the paths from conscientiousness, openness, and academic self-efficacy beliefs at the age of 16 to senior high-school grades; (5) the path from junior high-school grades to high-school grades; (6) the path from junior high-school grades to academic self-efficacy beliefs at the age of 16, in

accordance with social cognitive theory that points to previous mastery experiences as the most important determinants of self-efficacy beliefs; (7) the covariance among all of the variables at the age of 13 and also at the age of 16. The posited model is shown in Figure 1. In this model, we also considered SES as time invariant covariate influencing all variables (for not cluttering the figure, the effects of SES are not represented). Although we did not expect any significant difference between males and females, we tested for possible gender differences conducting a multiple-group analysis.

The participants were 412 children, 196 boys and 216 girls, part of an ongoing longitudinal project that started in 1987 with primary goal of investigating the personal and social determinants of children and adolescents' adjustment.

This longitudinal project includes a staggered, multiple cohort design, with different cohorts assessed at different time points. The participating children were originally drawn from two junior high schools in Genzano, a residential community located near Rome. Children were re-examined every other year till the end of senior high school and thereafter. The research was approved by a school council composed of parent and teacher representatives at the junior high-school level. In addition to parents' consent, children were free to decline to take part. The current study includes two cohorts composed of students belonging to both schools and assessed at four different time points. Both cohorts were aged 13 years at time 1 (7th grade), aged 14 at time 2 (8th grade/end of junior high school), aged 16 at time 3 (10th grade), and aged 19 at time 4 (13th/end of senior high school). At times 1 and 2, the data were collected in the children's classrooms by two female experimenters. At times 3 and 4, the adolescents were contacted by phone and invited to participate in the study for which they received a small payment. The participation rate was high during the longitudinal data collection: 98% and 97% from T1 to T2 for first cohort and second cohort; 90% and 96% from T1 to T3 for first cohort and second cohort; 62% and 69% from T1 to T4 for first cohort and second cohort. Multivariate analysis of variance revealed that there were no statistically significant differences on the means of the variables of interest ($F [7, 304] = 1.34, p = .17$) between the participants who provided complete data for the present study and the attrited group. Sixty-one adolescents (14.8%) dropped out of the school after the end of junior high school. Preliminary analysis revealed that adolescents who dropped out of the school had lower SES ($r = .30, p < .001$). The remaining participants were enrolled in classical and scientific lyceums (53.5%), technical schools (31.6%), and professional schools (15.0%). The sample matched national data with regard to both occupational socio-economic and composition of the families (Istituto Italiano di Statistica, 2002).

All participants were assessed at four waves of data collection during the course of the longitudinal study. Measures of openness and conscientiousness and of perceived self-efficacy for academic achievement were administered at time 1, when participants were in enrolled in 7th grade of junior high school (13 years), and at time 3, when they were in enrolled in 10th grade of senior high school (16 years). Academic achievement was assessed in two critical period of school career: (1) at time 2, at the end of the junior high school (8th grade), which marked the end of compulsory education; (2) at time 4, at the end of the senior high school, before the entrance to the university.

At time 1, participants rated their openness and conscientiousness by means of the 'Big Five Questionnaire' – Children version (BFQ-C, Barbaranelli

et al., 2003). The BFQ-C contains 65 items (13 for each dimension) designed to assess the Big Five in childhood and early adolescence. In the present sample, the factor structure of the BFQ-C was examined through a principal axis factor (PAF) analyses (with Oblimin rotation). Due to the large number of items considered, we factor analysed the correlation matrix of 10 parcels, which represent aggregations of several individual items. The goodness-of-fit of the hypothesized five-factor model was assessed by the root mean square residual (RMR), which represents the average of the fitted residuals. Values lower than .08 indicates acceptable fit to the empirical data; values lower than .05 indicates an excellent fit (Hu & Bentler, 1998; 1999). The five-factor structure fitted the data (RMR = 0.01) and explained 53.97% of the total variance. The factor solution substantially replicated the typical five-factor structure of the Big Five model. Primary loadings were all higher than .80 ($M = .87, SD = .02$); secondary loadings were all lower than .08 ($M = .02, SD = .02$). At time 3, participants rated the same dimensions by means of the Big Five Questionnaire (BFQ, Caprara, Barbaranelli, & Borgogni, 1993; Caprara, Barbaranelli, Borgogni, & Perugini, 1993). This version contains 120 items designed to assess the Big Five in adulthood (24 for each dimension). Traits were assessed by items where participants rated the occurrence of the behaviour reported using a 5-point Likert scale ranging from 1 ('Almost never' for BFQ-C, and 'Very false for me' for the BFQ) to 5 ('Almost always' for the BFQ-C, and 'Very true for me' for the BFQ). The five-factor structure of the BFQ was examined by factor analyzing the correlation matrix of the 10 'facet' scales, designed to capture more specific aspects of the Five Factors. Factor analysis (PAF with Oblimin rotation) revealed a five-factor structure that explained 55.97% of the total variance (RMR = .01). An inspection of the pattern matrix confirmed the hypothesized five-factor model. Each pair of facets showed the highest loadings on the same factor, and lower loadings on the other factors. Primary loadings were all higher than .50 ($M = .57, SD = .14$), with the exception of scrupulousness, which loaded .29 on the respective factor (conscientiousness); secondary loadings were all lower than .35 ($M = .14, SD = .12$). All the Five Factors were assessed in this study, although we focused our attention on conscientiousness and openness. The conscientiousness scale measured dependability, orderliness, precision, and the fulfilling of commitments. Item samples were 'I like to keep all my school things in a great order' in the BFQ-C version, and 'Before completing a job I spend a lot of time revising it' in the BFQ version. Cronbach's alpha was .84 at time 1 and .81 at time 3. The Openness scale measured both self-reported intellect in the school domain and broadness or narrowness of cultural interests, and self-reported fantasy/creativity. Item

samples were 'I easily learn what I study at school' in the BFQ-C version, and 'I'm always informed about what's happening in the world' in the BFQ version. Cronbach's alpha was .79 at time 1 and .78 at time 3. The internal consistency coefficients of the other dimensions ranged from .72 (agreeableness) to .84 (emotional stability) at time 1, and from .71 (agreeableness) to .84 (emotional stability) at time 3.

The academic perceived self-efficacy scale included 15 items related to two broad domains of self-efficacy beliefs. The first domain referred to the perceived capability to successfully master different curricular areas (e.g., 'How well do you do in mathematics?'). The second domain concerned the perceived capacity for self-regulating learning activities, as the capacity to plan and organize the academic activities, to structure environments conducive to learning and to motivate themselves to do their school work (e.g., 'How well can you study when there are other interesting things to do?') (Bandura et al., 1996; Pastorelli et al., 2001).

3. Discussion

Although traits and self-efficacy beliefs have been often presented as expressions of rival views about personality functioning, above findings attest that both are crucial to account for academic achievement. In reality, individual differences in personality traits and self-efficacy beliefs have proved to play a unique and distinctive role in contributing to students' performance across different stages of academic career, in accordance with the posited hypothesis. Openness contributed to academic performance at the end of junior high school, more so than academic self-efficacy beliefs that contribute significantly to academic achievement too. One may argue that a basic trait like openness exerts its influence on academic achievement mostly at an earlier stage as a proxy of cognitive endowment fostering learning, more than self-efficacy beliefs that rest upon actual experiences and develop over time. Openness, instead, is no longer as important in senior high school where the capacity to regulate one's learning is most crucial to take advantage of one's own talents. One should also consider that the time interval between measurement of traits and academic performance in senior high school is shorter than the corresponding time interval at later stages of scholastic career. This may contribute to explain the differential effect of openness on academic achievement. Unexpectedly, conscientiousness did not contribute directly to academic achievement neither at the end of junior high school nor at the end of senior high school. Rather, it contributed to later academic self-efficacy beliefs which mediated its impact on subsequent senior academic achievement. One may argue that a basic trait like conscientiousness exerts its influence on academic

achievement by fostering self-regulatory abilities (Gerhardt, Rode, & Peterson, 2007) over the course of the scholastic career.

In accordance with our hypothesis, academic achievement at the end of junior high school significantly contributed to later perceived academic self-efficacy, while academic self-efficacy beliefs contributed to academic achievement in senior high school more so than in junior high school. This is in accordance with social cognitive theory either in viewing the capacity to learn from experience and to orchestrate own behaviour accordingly as the main determinants of self-efficacy beliefs, and in viewing self-efficacy beliefs as major determinants of motivation and achievement (Bandura, 1997, 2001). Likely confidence in one's capacity to regulate one's own learning and to manage the various scholastic activities and relations with teachers and peers is mostly crucial in senior high school to nurture the motivation needed to realize one's own potentials and to fully benefit of situational challenges.

Whereas academic perceived self-efficacy at age 16 retained its relation to academic achievement at the end of senior high school after we controlled for variations in prior academic performance and socio-economic level, the direct contribution of traits, was not significant. Yet one should not underestimate findings that support, although tenuously, the mediational role of academic self-efficacy beliefs in linking traits to academic achievement, mostly in senior high school. These findings accord with earlier findings from diverse lines of research which underline the crucial role of belief in one's capabilities in turning basic dispositions into specific behaviours (Caprara et al., 2009; Chen et al., 2001; Kanfer, 1992; Martocchio & Judge, 1997; Nauta, 2004). Finally, family SES affected academic performance directly in junior high school, and indirectly in high school, through its impact on prior academic attainment.

Above findings corroborate the posited hypotheses across gender. The posited model accounted for a substantial portion of variance at the end of both junior and senior high-school grades, namely at two important junctions of children's scholastic career and vocational choices. Thus, it deserves special attention as it may help to design proper strategies aimed to promote academic achievement while attenuating diversities due to personal and situational opportunities.

At the end of junior high-school, children examined in this study were expected to choose whether to enter the labour force and/or whether to continue school and which academic track to pursue. Whereas well-off children do better at school than poor children, mostly well-off children engage into senior high schools, like classical and scientific lyceums, that are as demanding as conducive to prestigious career in

university and in the labour market. Likely, SES is no longer so important in senior high school as it is in junior high school, due to the conspicuous abandonment of disadvantaged children. These findings have broad implications for interventions aimed to enhance children's academic pursuits. Whereas personality traits represent stable individual characteristics that mostly derive from individual genetic endowment, social cognitive theory provides guidelines for enhancing students' efficacy to manage their educational development and to regulate their learning activities (Bandura, 1997). Social cognitive theorists focus on a joint effort to raise competence and confidence primarily through mastery experiences (Pajares & Schunk, 2001). In reality, some progress has been made in translating this knowledge into operational models that foster self-directedness in academic pursuits (Bandura, 1997; Pajares & Urdan, 2006; Schunk & Zimmerman, 1994; Zimmerman, 1990; Zimmerman & Cleary, 2006). As academic self-efficacy is responsive to changes in instructional experience, teachers may play a crucial role in students' development and use of academic competencies (Pajares & Schunk, 2001; Robbins et al., 2004). Teachers that individualize and tailor classroom instruction to each student's academic abilities encourage children to estimate their progress according to their own internal standards (Pajares, 2002). Teachers and parents, who teach students how to set goals and monitor their learning progress, help to build their sense of efficacy for managing their academic activities and for taking full advantage of their potentials. Researchers have known for a long time that self-beliefs and self-regulatory habits that are developed early persevere and are more resistant to change (Pajares, 2002). Thus, educators and school administrators face the challenge of making their students' positive self-beliefs and self-regulatory strategies automatic and habitual as early as possible.

Summarizing, both traits and self-efficacy beliefs might play a major role in the promotion of academic achievement. Although basic traits may be useful for predicting school grades, relying only upon traits may be of limited value to actively promote school achievement. While children move through the various school levels, basic dispositions seem to let the way to more deliberate individuals effort to self-regulate learning and to strive to attain higher achievement. This finding may contribute to the existent literature, by providing a bridge between two main traditions of research in personality, namely trait theory and social cognitive theory, opening new directions for research aimed at better understanding how basic dispositions and potentials may turn into actual behaviours and sustain youth achievement at school.

There are potential limitations of this study which refer to the measures that were used (self-reports) and

the population examined. Perceived self-efficacy beliefs are private cognitive states that are necessarily accessible by the individuals who hold those beliefs. However, personality traits could be assessed not only through self-report. Researchers have previously found a fair degree of concordance between self- and other-reports of personality traits (Caprara, Barbaranelli, Borgogni, & Perugini, 1993). In future works it would be desirable to rely upon multiple raters to minimize bias due to self-report. Moreover, although the sample we used matched national profile with regard to basic socio-economic characteristics (i.e., occupation and composition of families), the use of students from only two schools might limit the extent to which results can be generalized. The above results need to be corroborated in different samples, as well as in different cultural contexts.

Conclusion

Openness and academic self-efficacy at the age of 13 contributed to junior high-school grades, after controlling for socio-economic status (SES). Junior high-school grades contribute to academic self-efficacy beliefs at the age of 16, which in turn contributed to high-school grades, over and above the effects of SES and prior academic achievement. In accordance with the posited hypothesis, academic self-efficacy beliefs partially mediated the contribution of traits to later academic achievement. In particular, conscientiousness at the age of 13 affected high-school grades indirectly, through its effect on academic self-efficacy beliefs at the age of 16. These findings have broad implications for interventions aimed to enhance children's academic pursuits. Whereas personality traits represent stable individual characteristics that mostly derive from individual genetic endowment, social cognitive theory provides guidelines for enhancing students' efficacy to regulate their learning activities.

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Table 1. Means, standard deviations, and correlations across time among conscientiousness, openness, academic self-efficacy, and junior high and high-school grades

	M	SD	1	2	3	4	5	6	7	8
1. Conscientiousness (13 years)	3.50 (3.66)	.65 (.63)	–	.67**	.55**	.47**	.27**	.36**	.22**	.21*
2. Openness (13 years)	3.64 (3.65)	.63 (.62)	.71**	–	.57**	.38**	.54**	.43**	.40**	.40**
3. Academic self-efficacy (13 years)	3.78 (3.74)	.46 (.43)	.53**	.53**	–	.30**	.29**	.45**	.31**	.22*
4. Conscientiousness (16 years)	3.29 (3.40)	.42 (.44)	.33**	.22**	.34**	–	.49**	.49**	.29**	.29**
5. Openness (16 years)	3.27 (3.41)	.37 (.42)	.24**	.41**	.32**	.37**	–	.40**	.28**	.24**
6. Academic self-efficacy (16 years)	3.60 (3.76)	.42 (.45)	.40**	.38**	.50**	.48**	.40**	–	.44**	.34**
7. Junior high-school grades (14 years)	2.96 (3.16)	.84 (.86)	.21**	.41**	.32**	.19*	.40**	.38**	–	.40**
8. High-school grades (19 years)	72.51 (78.76)	14.20 (12.72)	–.05	.06	.07	.15	.14	.30*	.37**	–

Note. Means and standard deviations for females are reported in parentheses. Correlations for females are above the diagonal; correlations for males are below the diagonal. * $p < .05$; ** $p < .01$.

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