

Predicting academic achievement in adolescents: The role of maturity, intelligence and personality

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Abstract

Background: Very few studies have examined whether the degree of adolescents' maturity has any effect on their academic performance. Moreover, there are no studies that show whether maturity explains variance additional to that explained by intelligence and personality. For this reason, the main aim of the current study was to determine how psychological maturity, the Big Five personality traits and mental aptitudes contribute to the prediction of adolescent academic performance. **Method:** 305 adolescents took part in the study. We performed correlations, multiple regression analysis and structural equation analysis. **Results:** As expected, results show that the main predictor is intelligence. The results also show that there is a relationship between psychological maturity and academic performance, although this is due only to the work orientation subscale. Moreover, conscientiousness influences academic performance because of its relation to the maturity factor work orientation. Likewise, openness to experience is also indirectly related to academic performance, due to its relationship with intelligence. **Conclusions:** The results of the current study suggest that psychological maturity is related to academic performance. Only two personality traits are correlated to academic performance, conscientiousness and openness to experience, although these traits do not have direct relationships with academic performance.

Keywords: Academic achievement, personality, psychological maturity, intelligence, adolescence.

Resumen

Predicción del rendimiento académico en adolescentes: el papel de la madurez, la inteligencia y la personalidad. **Antecedentes:** se han realizado muy pocos estudios sobre la posible influencia de la madurez sobre el rendimiento académico. Además, no hay estudios que muestren si la madurez explica varianza adicional a la explicada por la inteligencia y la personalidad. Por ello, el principal objetivo de este estudio es determinar cómo la madurez, los Cinco Grandes y las aptitudes mentales contribuyen a la predicción del rendimiento académico en adolescentes. **Método:** la muestra está formada por 305 adolescentes. Calculamos correlaciones, análisis de regresión múltiple y ecuaciones estructurales. **Resultados:** como se esperaba, los resultados muestran que el principal predictor es la inteligencia. Se obtuvo una relación entre madurez y rendimiento académico, que se debe únicamente a la subescala orientación al trabajo. Por otra parte, la responsabilidad influye sobre el rendimiento académico a través de su relación con el factor de madurez orientación al trabajo. Apertura a la experiencia también está indirectamente relacionado con el rendimiento académico, debido a su relación con la inteligencia. **Conclusiones:** los resultados sugieren que la madurez psicológica está relacionada con el rendimiento académico. Solo dos rasgos de personalidad correlacionaron con el rendimiento (responsabilidad y apertura a la experiencia), aunque sus relaciones no son directas.

Palabras clave: rendimiento académico, personalidad, madurez psicológica, inteligencia, adolescencia.

In recent decades the interest in identifying those variables that are related to academic achievement has been increasing, because this greater understanding in this area may be useful in reducing the high rates of academic failure. However, very few studies have assessed the relationship between the level of maturity and academic achievement in adolescents, even though adolescence is a period of life that is full of changes and transformations at various levels that can generate a considerable amount of stress. Moreover, although many studies focused on the relationship between academic performance and variables such as personality,

intelligence or basic cognitive processes, few of them have considered these variables simultaneously (Colom, Escorial, Shih, & Privado, 2007). For this reason, the aim of the current study is to determine what contribution psychological maturity, the Big Five personality traits, and mental aptitude make to the prediction of adolescent academic performance.

A considerable number of studies show that intelligence is one of the most important predictors of academic performance (e.g., Karbach, Gottschling, Spengler, Hegewald, & Spinath, 2013; Weber, Lu, Shi, & Spinath, 2013). In general, correlations between intelligence and academic performance range from .30 to .70, depending on the nature of the sample and the type of test used (Colom & Abad, 2007; Lynn & Vanhanen, 2012). Personality also plays an important role in the prediction of academic achievement because it affects student motivation and behavior in work situations (e.g., Paunonen & Ashton, 2013; Richardson, Abraham, & Bond, 2012). In fact, several studies show that personality

predicts academic performance, even after controlling for the effect of intelligence (Camps & Morales-Vives, 2013; Poropat, 2009; Richardson et al., 2012). Moreover, the study carried out by Colom et al. (2007) with Spanish adolescents found that the predictive validity for fluid intelligence-memory span was independent of the predictive validity of personality characteristics, which shows the importance of measuring both kinds of construct. Within the Big-Five Personality model, the trait that has most consistently been related to academic achievement is Conscientiousness (e.g., Camps & Morales-Vives, 2013; Poropat, 2009, 2014; Vedel, Thomsen, & Larsen, 2015). It is likely that students with high levels of conscientiousness perform better at school because they tend to be more hard-working, goal oriented and persistent, and are skilled at organizing their work and time. The meta-analysis carried out by Poropat (2009) shows that, of all the Five Factor Model dimensions, this trait has the strongest association with academic performance, and its correlation with academic performance is largely independent of intelligence. Another trait that has been related to academic performance is Openness to experience (Camps & Morales-Vives, 2013; Poropat, 2014). According to Caprara et al. (2011), the reason for this relationship is that students with greater openness to experience are more interested in learning and discovering new things. However, according to McCrae and Costa (1985) and Diseth (2003), this result is due to the relationship between Openness to experience and intelligence, particularly if it is taken into account that some studies have not controlled for the effect of intelligence. In fact, although openness to experience is a personality trait, it is related to intelligence (McCrae & Costa, 1985), so not controlling for intelligence may lead to confusing results. The results of some studies that did control for intelligence suggest that Openness to experience is not a direct predictor of academic performance (Heaven & Ciarrochi, 2012; Rosander, Bäckström, & Stenberg, 2011).

In general, no significant relationship has been found between agreeableness and academic performance (Camps & Morales-Vives, 2013; Rosander et al., 2011). Moreover, the meta-analysis carried out by Poropat (2009) shows that extraversion and emotional stability are not especially relevant to the prediction of academic performance.

According to Greenberger (1982), there is a relationship between maturity and educational attainment. More specifically, students with fewer educational aspirations tend to be less mature. Therefore, psychological maturity may be related to an interest in learning and the motivation to carry out academic activities in the best possible way. Moreover, the study carried out by Galambos, MacDonald, Naphtali, Cohen and Frias (2005) show that maturity is related to greater crystallized intelligence and better performance on some executive tasks. Their study suggests that those students who are more intelligent are likely to be more persistent, independent and responsible, and have a clearer understanding of themselves. Taking into account that crystallized intelligence depends on learning processes, psychological maturity and academic performance are expected to be related. However, very few studies have examined whether the degree of maturity of adolescents at a particular moment has any effect on their academic performance. The few studies that have been made on this issue suggest that it does (e.g., Steinberg et al., 1989; Oh-Hwang, 1994). However, these studies do not assess intelligence, so other studies need to be made to determine whether these results can be explained simply by the relationship that psychological maturity

and academic performance have with intelligence, especially with crystallized intelligence.

In the current study we define psychological maturity as the ability to take on obligations, to make responsible decisions that take into account one's own characteristics and needs, and to accept the consequences of one's own actions. This definition refers specifically to the concept of individual adjustment proposed by Ellen Greenberger and colleagues (e.g., Greenberger, 1984; Greenberger & Sørensen, 1973) within their model of psychosocial maturity, which is divided into three components: work orientation, self-reliance and identity. Work orientation is defined as the individual's willingness to fulfill his or her own obligations (for example, adolescents start their homework and do not stop until they finish). Self-reliance is defined as a person's willingness to take the initiative, without allowing others to exercise excessive control. Identity is defined as the adolescent's understanding of him or herself.

Although the study carried out by N. Galambos suggests that maturity affects learning process, the few studies carried out on this issue have found contradictory results about which components of maturity are predictors of academic achievement (Steinberg et al., 1989; Oh-Hwang, 1994). For example, the study carried out by Steinberg et al. (1989) suggests that identity is indirectly related to academic performance, through its relationship with self-reliance and work orientation. However, Oh-Hwang found a direct but negative relationship, and Berzonsky and Kuk (2005) found a direct and positive relationship. Although some studies suggest that independent students with initiative tend to get better grades (Berzonsky & Kuk, 2005; Santor, Messervey, & Kusumakar, 2000), Camps and Morales-Vives (2013) did not find a relationship between self-reliance and academic achievement.

Most studies found a direct and positive relation between the subscale work orientation and academic performance: that is to say, students who are motivated to succeed and persevere tend to get better grades (Camps & Morales-Vives, 2013, Greenberger, 1982; Steinberg et al., 1989). It should be noted that Lounsbury and Gibson (1998) and Lounsbury, Sundstrom, Loveland, and Gibson (2003) proposed a concept called *Work drive*, which evaluates a construct that looks similar to Greenberger's subscale work orientation. This concept refers to the enduring motivation to invest time and effort to complete projects, know deadlines, be productive and achieve success. Although they are similar concepts, work orientation is more general, covering more aspects than just school activities (such as housework or other responsibilities). Lounsbury et al. (2003) carried out a study on the prediction of academic achievement in undergraduate students, using as predictors the variables work drive, intelligence and the Big Five personality traits. They used a hierarchical multiple regression analysis and observed that when work drive was entered before the Big Five variables, the Big Five variables did not add significantly (either as a set or individually) to the prediction of course grade. This result highlights the importance of working hard to achieve academic success.

Taking into account the results of previous studies, the main goal of the current study is to determine how psychological maturity, the Big Five personality traits and mental aptitudes contribute to the prediction of adolescent academic performance. Although previous studies show that intelligence and personality should be taken into account in the prediction of academic achievement, the few studies that focus on the role of maturity in the prediction of academic

achievement do not include these variables. Therefore, these previous studies do not show whether maturity explains variance additional to that explained by intelligence and personality. For this reason, a more specific objective of this study is to determine if the subscales of psychological maturity are predictors of academic performance and explain variance additional to that explained by intelligence and personality. With regard to the Big Five personality traits, we expect to find results consistent with the study carried out by Lounsbury et al. (2003) with undergraduate students. Their results suggest that the Big Five do not explain more variance than that explained by intelligence and work drive. As work orientation is conceptually related to work drive, we expect to find that the Big Five do not explain variance additional to that explained by work orientation and intelligence. More specifically, we expect to find a significant correlation between academic performance and the trait conscientiousness, but we do not expect this relation to be direct but to depend on the existing relation between conscientiousness and work orientation, because the study by Morales-Vives, Camps and Lorenzo-Seva (2013) shows that conscientiousness and work orientation are correlated. Likewise, we expect that the correlation between openness to experience and academic performance depends on the relation between openness to experience and intelligence, as some authors have pointed out (McCrae & Costa, 1985; Diseth, 2003). Taking into account that the meta-analysis carried out by Poropat (2009) shows that the traits extraversion and emotional stability are not especially relevant to the prediction of academic performance, no significant relationships were expected in the current study for these traits.

Method

Participants

The participants were 305 adolescents (146 boys and 159 girls) recruited from two state high schools in the province of Tarragona (Spain). To ensure that the sample was heterogeneous with students from different socioeconomic backgrounds, 111 participants were recruited from a school in a city and the other 194 participants from a school in a country village. 37.7% of students were studying the third year of lower-secondary education, 21.3% of students were studying the fourth year of lower-secondary education, 21.6% were studying the first year of upper-secondary education and 19.3% the second year of upper-secondary education. Regarding the kind of school (urban versus rural), the Chi-squared test for homogeneity of frequency distributions showed no significant differences between the four groups of Centre \times Sex ($\chi^2 = 0.97$; $p = .33$). Neither were there any significant differences between the eight groups of Grade \times Sex ($\chi^2 = 3.2$; $p = .36$). The participants were between 14 and 19 years old, and the mean age and standard deviation were 15.7 and 1.2, respectively.

Instruments

Primary Mental Abilities (PMA; Thurstone, 1938). This test assesses the following mental abilities: Verbal (PMA-V), Spatial (PMA-S), Numerical (PMA-N), Reasoning (PMA-R) and Word Fluency (PMA-WF). This test comprises scales of fluid and crystallized intelligence.

Psychological Maturity Assessment Scale (PSYMAS; Morales-Vives, Camps & Lorenzo-Seva, 2012, 2013). It includes three

scales: Work orientation (WO), Self-reliance (SR) and Identity (ID). It has 26 items and it provides individuals' scores free of social desirability and acquiescence. These response biases are corrected using the procedures proposed by Ferrando, Lorenzo-Seva and Chico (2009) and Lorenzo-Seva and Ferrando (2009). Item responses are made using a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). The reliability of the total scale is .82 and the reliabilities of the subscales are: .71 for WO, .78 for SR and .77 for ID. This is a short questionnaire, so these reliabilities can be regarded as adequate.

Overall Personality Assessment Scale (OPERAS; Vigil-Colet, Morales-Vives, Camps, Tous, & Lorenzo-Seva, 2013). OPERAS measures the Big Five personality traits: Extraversion (EX), Emotional Stability (ES), Conscientiousness (CO), Agreeableness (AG) and Openness to Experience (OE). Responses are given on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). It contains 40 items and it provides individuals' scores free of social desirability and acquiescence. Response biases are corrected using the procedures proposed by Ferrando, Lorenzo-Seva and Chico (2009) and Lorenzo-Seva and Ferrando (2009). The reliabilities of the subscales are: .86 for EX and ES, .77 for CO, .71 for AG and .81 for OE. It is a short questionnaire, so these reliabilities can be regarded as adequate.

Academic performance was assessed by the average grades obtained in school subjects.

Procedure

This study was carried out in accordance with the recommendations of Spanish organic law 15/1999 and the Spanish Agency for Data Protection, which regulate the fundamental right to the protection of data. We obtained written informed consent from the parents of all participants.

The tests were administered collectively to groups of 25-35 participants. They were asked to volunteer to answer the inventories in their classroom. The anonymity and confidentiality of individual results was guaranteed. The only descriptive data that we collected was date of birth, sex and classroom. To calculate academic performance, we asked the schools to provide us with the grades the participants had been awarded in the term prior to the study, without the names of the students, only the date of birth and classroom, to guarantee anonymity and confidentiality.

Data analysis

Statistical analyses were carried out using SPSS 22, MIMR-Raw.sps (Lorenzo-Seva, Ferrando, & Chico, 2010) and M-Plus v6.1 (Muthén & Muthén, 2010). We performed correlations and multiple regression analysis to determine the predictive value of the different variables on academic performance. Standardized coefficients (also known as beta weights) are context dependent (Courville & Thompson, 2001) and often do not work well for explanatory purposes, especially in the presence of substantially correlated predictors, in which case they can also become very unstable (Cooley & Lohnes, 1971; Johnson, 2000). Moreover, multicollinearity can also affect the magnitude of beta weights. For this reason, we used additional indexes to assess the relative importance of these predictors: Johnson's structural coefficients and relative weights (Johnson, 2000). Johnson's relative weights estimate the relative contribution each variable makes to the

prediction of a dependent variable, taking into account both its individual contribution and its contribution when combined with other variables. These are presented as percentages (i.e., they are divided by R^2 and multiplied by 100). We calculated these additional indexes with the program MIMR-Raw.sps, developed by Lorenzo-Seva, Ferrando and Chico (2010), which runs automatically from the SPSS syntax window, and the output can be configured in a variety of ways.

Finally, on the basis of the results obtained in the multiple regression analyses and the previously established hypothesis, we performed structural equation analysis. Specifically, we performed a structural equation analysis to test a model for predicting academic performance.

Results

Table 1 shows the descriptive statistics for the PMA, OPERAS and PSYMAS questionnaires, and also for academic performance. As can be seen, boys had a worse academic performance, $t(303) = 3.00, p < .01$, Cohen's $d = 0.34$, and lower scores on the personality traits openness to experience, $t(303) = 3.51, p < .01$, Cohen's $d = 0.40$, and agreeableness, $t(303) = 2.36, p < .05$, Cohen's $d = 0.27$. However, boys obtained higher scores on emotional stability, $t(303) = -5.20, p < .01$, Cohen's $d = 0.60$. Regarding the intelligence measures, boys had lower scores on PMA-R, $t(303) = 3.65, p < .01$, Cohen's $d = 0.42$, and PMA-N, $t(303) = 2.67, p < .01$, Cohen's $d = 0.31$.

The correlations between the various measures are shown in Table 2. As can be seen, there is a significant correlation between academic performance and two personality traits: conscientiousness and openness to experience. Academic performance is also correlated with all the scales of intelligence, and one scale of psychological maturity: work orientation.

A stepwise multiple regression analysis was also carried out. All the subscales were entered into the regression equation as potential predictors of academic performance. The R^2 was .30 ($F(6,298) = 18.4, p < .01$) and the 95% confidence interval was .24 and .41. Table 3 shows the standardized regression coefficients (Beta) obtained, the structure coefficients, Johnson's relative weights

and the bootstrap confidence intervals. The table only shows the variables that present significant structure coefficients, and whose Johnson's relative weights indicate that these variables contribute substantially to the prediction of academic performance. Only eight predictors (conscientiousness, openness to experience, work Orientation, PMA-V, PMA-s, PMA-R, PMA-N and PMA-W) turned out to have significant structure coefficients, with bootstrap 95% confidence intervals that did not include the zero value. Although the Beta of PMA-V, PMA-S and PMA-W were not

Table 1
Descriptive Statistics for academic performance, PSYMAS, OPERAS and PMA measures

		All	Girls	Boys
	Scales	M (SD)	M (SD)	M (SD)
PSYMAS	AP	5.7 (1.3)	5.9 (1.3)	5.5 (1.2)**
	WO	49.9 (10.4)	50.5 (10.8)	49.3 (9.9)
	SR	47.5 (12.3)	47.2 (11.0)	47.8 (13.5)
	ID	50.2 (9.9)	50.3 (10.0)	50.2 (9.8)
	Total	48.9 (10.9)	49.0 (10.8)	48.9 (11.0)
	EX	48.8 (10.2)	49.5 (10.9)	48.0 (9.4)
OPERAS	CO	44.5 (10.7)	44.6 (11.3)	44.4 (10.1)
	ES	46.5 (11.3)	43.4 (11.2)	49.9 (10.5)**
	AG	47.6 (10.2)	49.0 (9.9)	46.2 (10.3)*
	OE	43.4 (11.5)	45.5 (11.9)	41.1 (10.6)**
PMA	PMA-V	21.5 (7.1)	21.9 (7.1)	21.1 (7.1)
	PMA-S	25.1 (12.9)	24.5 (13.1)	25.7 (12.6)
	PMA-N	12.3 (7.0)	13.2 (6.4)	11.2 (7.4)**
	PMA-R	17.2 (6.6)	18.5 (6.1)	15.8 (6.8)**
	PMA-W	39.9 (11.0)	41.1 (10.5)	38.8 (11.5)

Note: AP = Academic performance, WO = Work orientation, SR = Self-reliance, ID = Identity, EX = Extraversion, CO = Conscientiousness, ES = Emotional stability, AG = Agreeableness, OE = Openness to experience, PMA-V = Verbal, PMA-S = Spatial, PMA-N = Numerical, PMA-R = Reasoning, PMA-W = Word Fluency
* $p < .05$; ** $p < .01$

Table 2
Correlation matrix between variables

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Grades													
2. Work orientation	.28**												
3. Self-reliance	.02	.26**											
4. Identity	.03	.29**	.37**										
5. Extraversion	-.08	.08	.12*	.37**									
6. Conscientiousness	.21**	.51**	.31**	.32**	.14*								
7. Emotional stability	.00	.17**	.26**	.56**	.32**	.29**							
8. Agreeableness	-.05	.20**	.13*	.30**	.06	.25**	.26**						
9. Openness to experience	.27**	.22**	.16**	.07	.04	.31**	.02	.04					
10. PMA-V	.31**	.27**	.32**	.04	-.08	.27**	.05	.01	.31**				
11. PMA-S	.22**	.07**	.14*	.07	.05	.06	.10	.01	.12*	.36**			
12. PMA-N	.27**	.10	.08	.15**	.10	.03	.09	.14*	.04	.27**	.16**		
13. PMA-R	.35**	.19**	.12*	.15**	.07	.08	.07	.20**	.20**	.44**	.47**	.33**	
14. PMA-W	.23**	.17**	.18**	.05	.12*	.13*	.05	.10	.33**	.48**	.24**	.19**	.31**

** $p < .01$, * $p < .05$

Table 3
Structural coefficients and Relative Weights of Johnson

Scales	Beta	SC	Bootstrap 95% C.I. for SC		RW	Bootstrap 99% C.I. for RW		
			Lower	Upper		Lower	Upper	
OPERAS	CO	.14	.38	.19	.51	8.0	2.3	16.0
	OE	.13	.50	.30	.62	11.1	3.1	20.8
PSYMAS	WO	.18	.52	.32	.64	14.6	4.9	24.3
	PMA-V	.05	.56	.37	.70	8.7	2.6	18.7
PMA	PMA-S	.05	.41	.20	.53	5.8	1.4	12.2
	PMA-R	.21	.64	.45	.74	19.4	7.7	30.7
	PMA-N	.19	.50	.28	.64	15.6	4.3	27.0
	PMA-W	.04	.43	.24	.56	5.0	1.4	11.5

Note: SC = Structure coefficient, C.I. = Confidence interval, RW = Relative weight (reported as percentages), AP = Academic performance, WO = Work orientation, SR = Self-reliance, ID = Identity, EX = Extraversion, CO = Conscientiousness, ES = Emotional Stability, AG = Agreeableness, OE = Openness to experience, PMA-V = Verbal, PMA-S = Spatial, PMA-N = Numerical, PMA-R = Reasoning, PMA-W = Word Fluency

significant, the fact that the structure coefficients and Johnson’s relative weights were significant suggests that they should also be included in the model, because they contribute significantly to the prediction of academic performance. To sum up, the scales that most contribute to predict academic performance are reasoning,

numerical aptitude, work orientation and openness to experience, as indicated by Johnson’s relative weights.

Finally, a Structural Equation Model was proposed to better understand the relationships between these variables. Figure 1 shows the model that we tested. It includes the following variables: intelligence, work orientation, openness to experience, conscientiousness and academic performance. In the figure, G is the latent general factor of intelligence obtained from the PMA subscales. As can be seen, while the paths between academic achievement and the variables Factor G and work orientation were significant, the path between openness to experience and academic performance was not. Likewise, the path between conscientiousness and academic performance was not significant. The values obtained for the indices of fit were: the ratio $\chi^2/df = 2.5$, GFI = .96 and CFI = .92, SRMR = .042 and RMSEA = .072. According to Schermelleh-Engel, Moosbrugger and Müller (2003), a ratio of χ^2/df between 2 and 3 is indicative of a “good” or “acceptable” data-model fit, respectively. Values of CFI and GFI higher than .90 indicate an acceptable fit (Bentler, 1990), and a value of SRMR less than .08 is indicative of relatively good fit (Hu & Bentler, 1999). RMSEA indices close to .06 or a stringent upper limit of .07 are also indicative of relatively good fit (Hu & Bentler, 1999; Steiger, 2007). Therefore, these results suggest that the fit for this model in the whole sample was acceptable. Furthermore, the multiple-group model with gender as a grouping variable showed that strict measurement invariance was attained. So, the measurement properties of the fitted model can be considered to be the same for boys and girls.

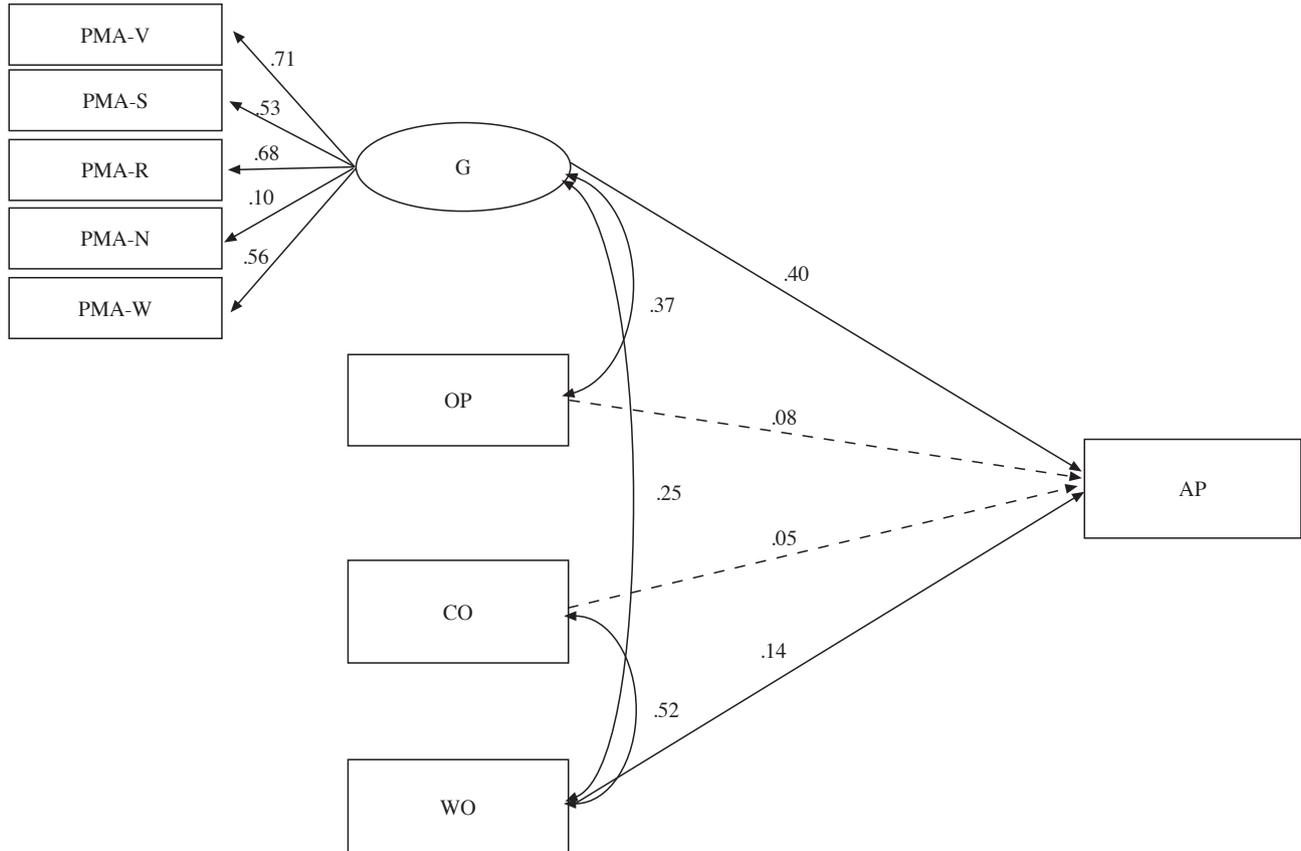


Figure 1. Structural equation model

Discussion

Knowing which variables are related to academic achievement may be useful for implementing measures to improve student achievement at school. For this reason, the main aim of this study was to determine how psychological maturity, the Big Five personality traits and mental aptitudes contribute to the prediction of adolescent academic performance. As can be seen in the structural equations model, the results show that the main predictor is intelligence, which is congruent with previous studies that show the relevance of intelligence to the prediction of academic achievement in primary and secondary school (e.g., Karbach, Gottschling, Spengler, Hegewald, & Spinath, 2013; Weber, Lu, Shi, & Spinath, 2013). Moreover, the regression analysis shows that reasoning, numerical and verbal abilities are the subscales with the highest structural coefficients and Johnson's relative weights, which means that these variables make a greater contribution to the prediction of academic performance than the other subscales.

Several studies suggest that, during secondary education, personality traits and intelligence predict academic performance (e.g., Chamorro-Premuzic & Furnham, 2003; Fischer, Schult, & Hell, 2013). In our study, only conscientiousness and openness to experience are correlated with academic performance. In fact, previous studies have pointed out that trait conscientiousness is a predictor of academic performance, even after controlling for the effect of intelligence (Camps & Morales-Vives, 2013; Poropat, 2009, 2014; Vedel et al., 2015). In fact, conscientiousness involves being efficient, organized and dutiful, with a tendency to show self-discipline, which may explain the relationship with academic performance. Likewise, previous studies have also found a relationship between openness to experience and academic performance (Camps & Morales-Vives, 2013; Poropat, 2014). However, some authors have pointed out that the relationship between these variables is indirect because of the relation between openness and intelligence (Diseth, 2003; McCrae & Costa, 1985). The issue is that some studies have not controlled for the effect of intelligence, which makes it difficult to know if the relation between openness to experience and academic performance is direct or indirect. In the current study, the structural equation model shows that the relation between the two variables is not direct. More specifically, the structural equation model shows that the relationship between this personality trait and academic performance is explained by the relation between openness to experience and intelligence, as some previous authors have pointed out (Heaven & Ciarrochi, 2012; Rosander et al., 2011).

The relationship between conscientiousness and academic performance is not direct either. In fact, the structural equation model shows that the relationship between this personality trait and academic performance is explained by the relationship between Conscientiousness and one of the subscales of psychological maturity, work orientation. This result was expected because previous studies show that work orientation is related to conscientiousness (Camps & Morales-Vives, 2013; Morales-Vives et al., 2012, 2013). Moreover, the results of the current study are congruent with those of a previous study by Lounsbury, Sundstrom, Loveland, and Gibson (2003), who found that the Big Five factors do not explain any more variance of academic performance than that already explained by intelligence and work drive. In fact, work drive is a variable that is conceptually similar to work orientation,

although it is more specific because it refers to the motivation to invest time and effort to complete projects, respect deadlines, be productive and achieve success. However, work orientation is a more general variable because it involves responsible behavior in different contexts, not only at school (for example, accepting one's own responsibilities within the household). Therefore, the results of the current study are similar to those obtained by Lounsbury et al. (2003), because the only variables with direct relationships with academic performance are intelligence and work orientation. In fact, none of the Big Five have direct relationships with academic performance. These results show that responsibility, along with intelligence, is relevant to the prediction of academic performance, as Lounsbury et al. (2003) pointed out.

Although previous studies agree that work orientation is relevant to the prediction of academic achievement, the role of the other two subscales is not so clear. Steinberg et al. (1989) found that the identity subscale was indirectly related with academic performance, through its relationship with self-reliance and work orientation, but Berzonsky and Kuk (2005) found a direct and positive relationship and Oh-Hwang found a direct but negative relationship. Some studies suggest that independent students with initiative tend to get better grades (Berzonsky & Kuk, 2005; Santor, Messervey, & Kusumakar, 2000), but a recent study by Camps and Morales-Vives (2013) did not find a relationship between self-reliance and academic achievement. In the current study we have not found significant correlations between these two subscales and academic performance, which suggests that these subscales are not related to academic achievement. However, few studies have analyzed the relationship between psychological maturity and academic performance, so further studies are needed to determine the role of identity and self-reliance.

To sum up, the results of the current study show that the variables that best explain academic performance are intelligence and willingness to work hard and seriously in academic activities. This information may be helpful so that realistic programs to prevent academic failure can be developed. According to the results of the current study, these programs should focus on promoting a responsible attitude in students, and creating a school environment in which dedication and hard work are valued and reinforced. More specifically, the results show that there is a relationship between psychological maturity and academic performance, although this is due only to the work orientation subscale. Moreover, none of the Big Five personality traits have direct relationships with academic performance, which is consistent with the results obtained by Lounsbury et al. (2003). In fact, only two personality traits are correlated to academic performance: conscientiousness and openness to experience. However, the relationship between conscientiousness and academic performance is explained by the relationship that this personality trait has with the maturity factor work orientation. Likewise, openness to experience is also indirectly related to academic performance, due to its relationship with intelligence, a result that supports the studies by McCrae and Costa (1985) and Diseth (2003).

The use of the grades obtained by students to assess academic achievement is very common in the literature. The study carried out by Hoffman and Lowitzki (2005) shows that high-school grades are a useful measure and stronger predictors of success than standardized tests. However, not all the schools, courses and teachers use the same criteria to grade their students. For this reason, further studies should be done using standardized

measures of scholastic knowledge to see whether the results are the same. Furthermore, it would be interesting to assess academic achievement more globally, including performance in different kinds of activity (individual versus group activities, theoretical versus practical activities, etc.) and different subjects (languages, math, etc.), to determine which individual personality and maturity characteristics are most relevant to each of these issues. Further studies should also be done using other measures and models of personality, such as The Zuckerman-Kuhlman-Aluja Personality Questionnaire (García, Escorial, García, Blanch, & Aluja, 2012), to learn more about the relationship between maturity and personality, and their relevance to academic performance.

Declaration of Interest Statement

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