Adolescents' Prosocial Behavior Predicts Good Grades Beyond Intelligence and Personality Traits

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Abstract

Objective. Researchers have demonstrated the prediction of academic functioning by children's prosocial behavior (PB). The goal of our study was to examine the contribution of adolescents' PB for middle and senior high school grades after controlling for stability of achievement and for intelligence, Big Five traits, and socio-demographic variables (i.e., sex and SES). **Method**. Study 1 examined on 165 adolescents (48.5% boys) the prediction by peer-reported PB in 7th grade of academic achievement at the end of junior high school, after controlling for the above variables. Study 2 examined the prediction by 927 (52% girls) 8th graders' PB of academic achievement 5 years later, at the end of senior high school, taking into account the stability of grades, personality traits, and socio-structural variables. **Results**. Overall, hierarchical regression analysis indicated in both studies PB and Openness significantly predicted better grades in the short-term and over time despite the high stability of grades across five years. Extraversion negatively predicted academic achievement across one year in junior high school. **Conclusion.** Findings supported the view of PB as a strength and a key resource for adolescents' academic attainment.

Keywords: Academic Achievement; Big Five Traits; Intelligence; Longitudinal Study; Prosocial Behavior.

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Different levels of educational attainments at different school grade levels may substantially affect adolescents' subsequent development. In particular, in the U.S., eight-grade academic achievement has been found to a stronger predictor of college and career readiness than other factors assessed in high school (ACT, 2008). Similarly, senior high school grades have been associated with an increased chance to be admitted, to attend, and to complete college (Westrick, Le, Robbins, Radunzel, & Schmidt, 2015) and with higher earnings in adulthood (French, Homer, Popovici, & Robins, 2015).

In the last 20 years, the Positive Youth Development (PYD) perspective has emphasized the strength and the plasticity of adolescents' development (Damon, 2004; Lerner, Phelps, Forman, & Boers, 2009), and focused on understanding developmental factors that sustain adolescents' personal and social well-being. In accordance with this perspective, and considering the relations between academic success in childhood and subsequent academic and life outcomes, it is important to clarify the "flexible" factors that may promote academic success.

Prosocial behavior (PB) has been considered a relatively “malleable” variable that can be strengthened through appropriate educational actions (e.g., Caprara, Luengo Kanacri, Zuffiano, Gerbino, & Pastorelli, 2015; Eisenberg, Fabes & Spinrad, 2006; Greenberg et al., 2003). PB often has been defined as voluntary actions aimed at benefiting others (e.g., helping, consoling, donating; Eisenberg et al., 2006). PB has been found to predict school adjustment (i.e., academic achievement and peer acceptance) across grade levels in kindergarten and primary school (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000; Closson, 2009; Wentzel, 1993; Wentzel & Mc Namara, 1999). In contrast to prior

research, our research focused on the prediction by young adolescents' prosocial behavior of subsequent final grades in middle and senior high school. In particular, we examined the unique prediction by PB of achievement both in a short- (Study 1) and long-term perspective (Study 2), once taking into account intelligence and personality traits.

Prosocial Behavior and Academic Success

A large amount of empirical research has documented the beneficial role of PB for the actor, as well as for the target (e.g., Eisenberg, et al., 2006; Wentzel, 1993). PB is associated with better peer relationships (Eisenberg et al., 2006), higher levels of self-esteem (Jacobs, Vernon & Eccles, 2004; Zuffianò et al., 2014), and civic engagement during the transition from adolescence to young adulthood (e.g., Luengo Kanacri et al., 2014). **A limited number of longitudinal studies have addressed the relation between PB and academic achievement, and most of them have focused on elementary school children's PB as assessed by teachers. In particular, Caprara and colleagues (2000) found that third grade children's PB (assessed simultaneously by children, peers, and teachers) predicted better academic achievement (and social acceptance) at the end of middle school (i.e., five years later) after controlling for earlier achievement and aggressive behavior. This study supported the long-term unique contribution of PB to social and school adjustment, even after children were in new schools with new teachers and peers.**

Other researchers have found that teachers' reports of PB at age 6 were associated with other indicators of educational attainment, such as higher likelihood of completing high school, especially in medium high hyperactive children (Vitaro, Brendgen, La Rose, & Tremblay, 2005). In contrast, Kokko and colleagues (2006) found no significant associations between different trajectories of teacher-rated PB from elementary school to entrance into middle school and later school drop-out, but they examined a specific sample: low socioeconomic male students. Similarly, Miles and

Stipek (2006) analyzed low-income children's teacher-reported PB and found that PB predicted literacy grades from first to third grade, but not from third to fifth grade.

Fewer studies are available in which students' PB in middle school was assessed through peers' reports, and most of those results are from short-term studies. For example, sixth grade PB predicted academic grades concurrently and two years later, even after controlling for the stability of academic achievement, antisocial behavior, and distress (Wentzel, 1993; Wentzel & Caldwell, 1997). Similar results have been obtained for the prediction of the eighth-grade achievement after controlling for socio-structural variables and cognitive abilities (Wentzel, 1993**). Chen and colleagues (Chen, Li, Li, Li & Liu, 2000) also found in China (where cooperation and helping others is particularly emphasized and positively evaluated; Ho, 1986) that 6th grade PB uniquely predicted academic grades at 8th, even when predicted simultaneously by sociability (which was not a significant predictor).**

However, teachers have fewer opportunities to observe older students' social interactions; thus, they are likely to be less reliable informants compared with peers, especially in late childhood and adolescence (Greener, 2000). In addition, peer-report assessments are probably a more reliable method to evaluate PB than are a single teacher's ratings, because the former reflects multiple classmates' evaluations rather than the report of a single individual (see Warden & Mackinnon, 2003). Overall, peer nominations (i.e., when children choose a restricted number of students whom they believe act more prosocially than their peers) has been used more than peers' ratings (i.e., when each child rates all of the other students; Greener, 2000). Probably one of the reasons is that starting in middle school in many countries, students are part of more than one peer group during school time (e.g., in different classes), and the large number of peers to be evaluated would increase the risk of the response bias for peers'

ratings (Polunin & Dishion, 2008). In contrast to using peers as reporters/nominators, self-report of PB has been less recommended because self-reports may be affected by social desirability and adolescents may be more likely to inflate the frequency of their PB (Eisenberg & Mussen, 1989; Greener, 2000).

Overall, the role of PB in adolescents' academic functioning seems an important but understudied topic. To our knowledge, no researchers have examined the relations between adolescents' PB and senior high school students' grades. Chen and colleagues (Chen, Liu, Rubin, Cen, Gao., & Li, 2002) found an association of PB in 6th grade (considered simultaneously with sociability) with educational attainment seven years later, but did not address specifically the relations of PB with grades. Adolescence is a period of important change. Maintaining positive relations with peers is an especially important goal for adolescents (Wentzel, 2004), and PB in Italy and North America sometimes tends to decline during those years (Carlo, Crockett, Randall, & Roesch, 2007; Luengo Kanacri, Pastorelli, Eisenberg, Zuffianò, & Caprara, 2013). So, it seems important to corroborate and integrate the available knowledge on PB and school grades. However, in doing so, it is important to take into account that school grades are the result of a variety of complex factors, including stable individual differences (Poropat, 2008)

Intelligence, Personality, and Academic Achievement

Among the factors that investigators suggest might affect adolescents' academic achievement are a variety of relatively stable individual differences, such as intelligence and personality traits. In particular, intelligence, conceived as cognitive abilities, has consistently predicted academic achievement in adolescence (Gagné & St Père, 2002; Laidra, Pullman, & Allik, 2007), even after controlling for other variables, such as gender, earlier academic

achievement, and personality traits (Di Fabio & Busoni, 2007; Downey, Lomas, Billings, Hansen, & Stough, 2014; Leeson, Ciarrochi, & Heaven, 2008; Zuffianò et al., 2013). A recent meta-analysis (Roth et al., 2015) concluded that intelligence is (one) of the most important predictors of school achievement across grades. In particular, the meta-analysis indicated that the importance of intelligence is stronger in middle and high schools than in elementary schools, probably because older students have to face with more complex subject matter and topics that require more cognitive abilities.

In terms of personality traits, when examining the Big Five personality traits (i.e., a comprehensive taxonomy of individual differences in personality; McCrae & Costa, 1999), Poropat (2009) found, in a meta-analysis, that conscientiousness and openness were the most relevant predictors of academic success. Conscientiousness (i.e., dependability, perseverance and will to achieve) may help adolescents to make more effective plans regarding studies, to be better self-regulated, and to maintain high effort in regard to achieving learning goals. Openness (i.e., imaginativeness and broad-mindedness) might sustain achievement by making students more interested in knowledge and discovery and by adopting a deep approach to learning and elaborative learning (e.g., Komarraju, Karau & Schmeck, 2009). Findings regarding the other personality traits have been inconsistent and not robust (Poropat, 2009). Some investigators studying young adolescents found that Extraversion (i.e., high level of energy and sociability) was associated with lower grades (e.g., Zuffianò et al., 2013), as was Neuroticism (i.e., high level of negative emotions), especially in older adolescents (Ackerman & Heggestad, 1997; De Raad & Schouwenburg, 1996). Finally, other researchers have reported a positive association of Agreeableness (i.e., cooperativeness and benevolence) with compliance behavior at school (Vermetten, Lodewijks, & Vermunt, 2001).

The Present Studies

The results of previous studies support the importance of academic achievement in middle school and in senior high school for later attainments (ACT, 2008; French, Homer, Popovici & Robins, 2015), as well as the positive relation of PB to middle school grades (e.g., Caprara et al., 2000; Wentzel, 1993). In accordance with the Positive Youth Development perspective (Damon, 2004; Lerner et al., 2009) that seeks to identify promoting factors of adolescents' development, we sought to understand the extent to which PB provides unique prediction of school grades beyond cognitive abilities and personality traits in junior high school, and continues to be relevant for predicting subsequent school grades.

In addressing the role of PB, it is also important to disentangle its unique role from basic personality/dispositional factors (i.e., intelligence and traits) that are relevant for both PB and academic achievement. In fact, some studies have indicated that PB is modestly related to intelligence or to cognitive abilities (especially at younger age; Carlo, Hausmann, Christiansen, & Randall, 2003; Weidman & Strayhorn, 1992; see Eisenberg, Fabes, & Spinrad, 2006), probably because prosocial children have sophisticated socio-cognitive skills, such as perspective taking.

With regard to personality traits, agreeableness has been found to be the strongest correlate of PB, even in adolescence (Graziano & Eisenberg, 1997; Shiner, 2000). Agreeable individuals are more intrinsically motivated to establish and maintain positive relations with others, so they typically are more prone to prosocial action. Weaker relations have been found for PB with Conscientiousness. Conscientious individuals are prone to be self-regulated and to adhere to ethical standard, characteristics related to some types (e.g., other-oriented) of prosocial actions (Caspi, Roberts & Shiner, 2005). With regard to the other traits, extraversion and openness have been found to be associated to volunteering or civic activities, specific forms of PB (e.g., Carlo, Okun, Knight & de Guzman, 2005). Finally,

findings of a negative association between PB and negative emotionality (see Eisenberg et al., 2006) suggest that emotional instability could interfere with prosocial actions.

Overall, most previous studies on the prediction of grades from PB have considered as simultaneous predictors other social behaviors (e.g., aggressive or antisocial behavior; Caprara et al., 2000; Kokko et al, 2006; Vitaro et al. 2005; Wentzel at al 1993), and a few researchers have considered simultaneous prediction by cognitive abilities (Wentzel, 1993) or personality traits, such as sociability (Chen et al., 2000; 2002). Therefore, it remains to be clarified the extent to which helping, caring, and sharing behavior in adolescence are associated with better grades when researchers have partialled out adolescents' cognitive abilities and their tendencies to be extraverted, gentle, calm, diligent or to have an open mind, factors that can be helpful for school success in different ways (Poropat, 2009). For example, adolescents' extraversion, agreeableness and conscientiousness have been found associated with better peer relations (Jensen-Campbell, et al, 2002; Jensen-Campbell, & Malcolm, 2007) that in turn could improve students' academic motivation (Wentzel, 1993).

To identify the unique contribution of PB to academic achievement after taking into account the contribution of intelligence and personality traits, we used data from two separate longitudinal studies in order to corroborate and extend previous findings. In Study 1, we examined the prediction by7thgrade PB of academic achievement one year later (at the end of junior high school) after controlling for previous academic achievement measured at 6th grade, personality traits at 7th grade, intelligence at 8th grade, and socio-structural variables (SES and gender). In Study 2, we extended the time lag, and we examined the unique predictive role of PB for academic achievement across a longer time lag: from 8th grade to the 13th grade (i.e., the end of senior high school), while taking into account the stability of academic achievement, personality traits, gender, and SES. **Low SES has been**

found significantly associated with lower grades (Sirin, 2005) and with higher prosociality (Piff, Kraus, Côté, Cheng, & Keltner, 2010). Furthermore, girls have found to have significantly higher grades (Voyer & Voyer, 2014) and behave more prosocially (Eisenberg, et al., 2006) than boys. So, both variables, if not taken into account, could have a confounding effect in examining the relations between PB and academic achievement. Finally, in both studies, we assessed PB with information obtained from peers.

Study 1

Method

The participants were 165 young adolescents (85 females; M_{age} = 12.43 *SD* = .57 at T1; M_{age} = 13.45; *SD* =.55 at T2) who were part of a longitudinal project that started in 2008 with the primary goal of investigating the personal and social determinants of children and adolescents' adjustment. The participating students were drawn from one public junior high school in Genzano, a residential community located near Rome, Italy. The majority of students were from intact families (93.4%). Approximately 8% percent of parents were in the professional or managerial ranks; 26% were merchants or operators of other businesses; 26% were skilled workers; 38% were unskilled workers; and 2% were unemployed. The majority of parents had a high school degree (46.4%), whereas 23.7% had a graduate degree or beyond. Approximately 20.5% finished middle school and only 9.4% achieved an elementary or less than elementary school education.

Procedure

Data collection procedures were approved by the Human Subjects Review Committee of the Sapienza University of Rome and granted from the school council that is the school's government body including representatives of parents and teachers. Signed consent was obtained from parents for each student. All the measures (except for academic achievement)

were collected in the classrooms by well-trained researchers, who articulated the purpose and response choices of the questionnaires to students.

Measures

Academic Achievement. Academic achievement was assessed both at the end of the 6th grade and at the end of 8th grade (i.e., the first and the last year of junior high school, respectively) through the use of original school records. In the Italian school system, teachers evaluate their students by using a ten-level gradation for each subject (from 1 = *extremely insufficient* to 10 = *excellent*). We created a composite measure of academic achievement from students' grades in their primary school subjects: Italian, math, science, foreign language (i.e., English and French), and social studies.

Prosocial Behavior. Prosocial behavior was assessed through peers' ratings at the end of 7th grade. It was an adaptation of a peer nomination measure of PB previously used in Italy (Caprara & Pastorelli, 1993; Pastorelli, Barbaranelli, Cermak, Rozsa, & Caprara, 2007). Participants rated each classmate on four items intended to evaluate the degree of frequency of helping, consoling, sharing, and sympathetic behaviors, that are basic components of individual prosociality (e.g., "How many times ____ helps others?") using a 5-point Likert scale (from 1 = *never/almost never* to 5 = *often*). **Because adolescents lived in a highly stable community, and spent their school time together within the same peer group in the same classrooms across middle school years, they knew each other well.** Following standard procedures (e.g., Visconti & Troop-Gordon, 2010), the prosocial behavior of each participant was assessed by averaging the ratings of the four items for about 20 classmates (α = .96).

Personality traits. Participants rated their personality traits on 30 items (6 items for each trait) in a reduced version of the Big-Five Questionnaire-Children (BFQ-C; Barbaranelli, Caprara, Rabasca, & Pastorelli, 2003) at the end of 7th grade. The psychometric

properties of the BFQ-C have been firmly established in several samples of Italian adolescents in junior high schools (Barbaranelli, Fida, Paciello, Di Giunta, & Caprara, 2008). Participants rated the frequency of the behavior noted in the item using a 5-point Likert scale (1 = almost never to 5 = almost always). The openness scale (α = .81) included items related to intellectual attitudes, especially in the school domain (e.g., "I easily learn what I study at school"). The conscientiousness scale (α = .76) assessed the orderliness, precision and the fulfilling of commitments (e.g., "I only play when I'm finished my homework"). The extraversion scale (α = .71) assessed characteristics such as activity, enthusiasm, and self-confidence (e.g., "I like to joke"). The agreeableness scale (α = .74) assessed concern and sensitivity toward others (e.g., "I trust in others"). The emotional instability scale (α = .82) included items assessing feelings of anxiety, depression, and anger (e.g., "I easily get angry").

Intelligence. Intelligence was assessed at the beginning of the 8th grade. We utilized the Italian version of the Culture-Fair intelligence test, a nonverbal measure designed to assess individuals' analytic and reasoning ability (i.e., fluid intelligence), for children from 8 to 13 years old (Cattell & Cattel, 1987). This instrument includes two parallel forms (form A and B), each composed of four subtests: series, analogies, matrices, and classification. The administration of both forms usually increases the reliability of the results. The two forms were administrated in sequential order to students, according to instructions. For our purposes, we consider the mean of form A and B as a measure of intelligence. The Spearman-Brown split-half coefficient of reliability was .77. **It was a bit lower than the coefficient reported in the original manual (.88).**

Socioeconomic Status (SES). Socioeconomic status was calculated using information reported by the students concerning their parents' occupation and education. Using the weighted least square minimum variance function of M*plus* 7.11 (Muthén & Muthén, 1998-

2012), factors scores were computed from a confirmatory factorial analysis in which SES was a single dimension defined by parents' education and occupation (Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011).

Analytical Approach

We examined the pattern of missing values of the variables considered in our study. To account for missing data, first, **we conducted an ANOVA to examine the differences between missing at 8th grade and non-missing participants in our study variables;** secondly, we used Full Information Maximum Likelihood estimation (FIML) of the parameters. FIML provides unbiased missing data estimates under ignorable missing data patterns such as missing completely at random (MCAR) and missing at random (MAR; Enders, 2010).

Next, we examined zero-order correlations among the key variables. Then, in order to examine the unique and additional contribution of 7th grade PB in predicting academic achievement one year later, we ran a hierarchical regression Model in M*plus* 7.11. **We included in the model the following observed variables: SES, gender, and academic grades at 6th grade, and at 8th grade. Big Five traits, intelligence and PB were modeled as latent variables. In detail, latent variables for personality traits were created by randomly assigning the 6 items assessing each trait to two parcels, treated as tau-equivalent indicators (each parcel was composed by 3 items; see Bagozzi & Edwards, 1998). Parcelling strategies help the researcher to reduce the number of model parameters, and improve the variable to sample size ratio (Little, Cunningham, Shahar, & Widaman, 2002). Similarly, we modeled intelligence by using the two parallel forms of the Culture Fair test. Finally, PB was included as a latent factor measured by the four items of the scale. In the model 1, we included previous academic achievement at 6th grade, gender, SES, and 8th grade intelligence and personality traits in the first**

step. In the model 2 we added PB in seventh grade, in the second step. Confidence intervals for the regression coefficients were computed using the bias-corrected bootstrap method (Efron, 1982). The upper and lower limit of the 95% confidence intervals of this coefficients were computed with 5000 bootstraps (each sample had the same size as the original one). Several indicators were used to evaluate model fit: χ^2 goodness of fit was adopted although obtaining a significant χ^2 becomes increasingly likely with large sample sizes (Kline, 1998); Comparative Fit Index (CFI; Hu & Bentler, 1999); Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR; Browne & Cudek, 1993). We accepted values greater than .90 for CFI (Bentler & Bonett, 1980) and under .08 for RMSEA and SRMR (Browne & Cudek, 1993).

Missing Data

Missing data for academic achievement were 0.006% (only one student) and a small amount of missing data was present for the other variables. **According to analyses of variance, missing participants at T2 did not significantly differ from their non-missing counterparts in the mean level of the study variables.** Importantly, the data met the criteria consistent with the assumption of data being missing completely at random (MCAR); for the model of analysis equation the Little's MCAR (1988) test was not significant (i.e., $\chi^2(35) = 42.03$, $p = .20$) so missingness on a variable was unrelated to the other measured or unmeasured variables (Enders, 2010).

Results

Table 1 displays the means, standard deviations, the zero-order correlations among the variables Correlations were mostly as expected. Whereas gender (i.e., being female), SES, intelligence, openness, conscientiousness, and prosocial behavior were all positively significantly correlated with academic achievement, emotional instability was negatively

correlated. **No significant correlation was found for extraversion**. Traits were usually significantly and positively correlated with each other, with the exception of emotional instability, which correlated negatively with the other traits. Finally, PB was positively correlated with gender (i.e., being female), extraversion, and agreeableness.

Table 2 summarizes the results of the hierarchical regression analysis. The model 1 showed moderate fit parameters (Chi-Square = 131.927, *df* = 69, *p* = 0.000; CFI = .933; RMSEA = .076 (.055 - .093) SRMR = .065). Overall, at first step, 70.8% of variance of academic achievement at the end of the eighth grade was explained by our predictors. Specifically, higher grades at 6th grade, higher openness and lower extraversion significantly predicted later better academic achievement. The model 2 showed moderate fit coefficient (Chi-square = 224.411, *df* = 125, *p = 0.000*; CFI = .944; RMSEA = .069 (.055 - .084) SRMR = .065). At the second step, beyond and above prior variables of the model, PB showed a small additional contribution to the explained variance (ΔR^2 = 1.3%). Although the two-tailed p-value associated with the beta coefficient was *p* = .066, as reported in Table 2, its CI did not include zero, thereby attesting to the significance of this effect. Specifically, higher levels of PB around age 13 predicted higher grades one year later.

Study 2

Method

Participants were recruited in Genzano, the same community as in Study 1, but they were from different birth cohorts and part of a different study. Participants were from families involved in an ongoing longitudinal project in that community that started in the early 1990s. This longitudinal project includes a staggered, multiple cohort design, with four cohorts assessed at different time points. The participating children were originally drawn from two

junior high schools in Genzano. Children were re-examined every other year till the end of senior high school and thereafter every two years.

The structure of the family of origin and the occupational socioeconomic distribution of our sample matched the national profile (ISTAT, 2002). The sample represented a socioeconomic microcosm of the larger society: 16% of parents were in professional or managerial ranks, 42% were merchants or employees in various types of businesses, 12% were skilled workers, 22% were unskilled workers, 3% were retired, 2% were temporarily unemployed but with a salary, and 3% were unemployed. In addition, most participants were from intact (not divorced) families (90.5%).

The current study includes four cohorts composed of students that were aged 14 years at Time 1 (T1; 8th grade/ end of junior high school). Data about the final grades at senior high school were collected at time 2, five years later, at the end of 13th grade. Overall, the study design included 927 youths (486 males) attending the last year of junior high school at the first assessment (T1; M_{age} = 14.03; SD = .34), and assessed at Time 2 (T2) five years later (M_{age} = 19.08; *SD* = .39). No multivariate cohort effect was found for the study variables, F (28) = 1.37; p >.05.

By T2, 16.6% of participants (N = 154) were no longer in the schools (they dropped out of school or chose professional courses that were preparatory for work and for which school evaluation followed criteria completely different from those used in senior high school). Overall, the retention rate at T2 for students who continued to attend senior high school was 43.6% from T1 to T2 (ranging from 39% to 49% across cohorts). The attrition was mainly due to the unavailability of individuals to take part in the later phases of the study or, in some cases, to their relocation out from the area of Genzano.

Missing Data

According to analyses of variance, missing participants at T2 did not significantly differ from their non-missing counterparts in the mean level of their SES, age, Extraversion, and Emotional Instability. However, missing participants were evaluated less prosocial by their peers (F = 39.76; *p* =.001; respectively M = .126, M =.181, d = .46), and reported less conscientiousness (F = 5.128; *p* = .024; respectively M = 3.343, M=3.471 , d = .19), less openness (F = 19.01; *p* = .001; M = 3.521, M = 3.758, d = -.32), less agreeableness (F = 8.41; *p* = .004, M =3.280, M =3.421, d = .21) and obtained lower grades at the end of junior high school (F = 50.82; *p* = .001; M =.-.065, M = .420, d = .37) when compared to their non-missing counterparts.

The data did not meet the strict assumption for completely missing at random (MCAR) because the Little's MCAR (1988) was significant (i.e., $\chi^2(75) = 129.10$ $p = .001$; (Enders, 2010). However, by considering *t* tests produced by the program output, we found that several predictors from 8th grade (i.e., School Grades, Agreeableness, Openness, Conscientiousness) significantly predicted the missingness of final grades, indicating that the assumption for missing at random could be supported. This result does not completely exclude the possibility that our data are not missing at random (MNAR). Nonetheless, in accordance with Bareli and Enders (2010), we considered that maximum likelihood estimation produces less biased estimates of missing values, compared to other techniques (e.g., multiple imputation model), even in conditions such as MNAR.

Procedures

Data collection procedures were approved by the Human Subjects Review Committee of the Sapienza University of Rome and the school council. At T1 (8th grade), parents gave consent and children were free to decline to take part. After obtaining consents, administration of questionnaires occurred in small groups at school. Two assistant researchers administered the scales in the classroom. The researchers explained that responses to the questionnaires

would be confidential. At T2, when participants were in senior high school, youths were contacted by phone and questionnaires and consent were sent by mail and returned by participants during scheduled meetings in the school.

Measures

Academic achievement. Academic achievement at T1 was measured at the end of 8th grade through the use of original school records. Eighth grade grades changed their range across the years of the studies, so we standardized final grades within each cohort to make them equivalent and to be able to combine grades from different cohorts. At T2, at the end of the senior high school, academic performance was self-reported by students. They indicated their final grades, which ranged from 60 to 100 according to the Italian Educational System, **where 100 was the highest grade[1].**

Prosocial Behavior. In grade 8, PB was assessed sociometrically. Students were presented with a list containing the names of children in their class. Each child selected three classmates who often shared things, helped others, and tried to comfort others when they were sad (Caprara & Pastorelli, 1993). As in Study 1, classmates spent most of their school time together and knew each other well. Nominations received were summed for each student and standardized within the classroom.

Personality traits. In grade 8, participants rated personality traits with the same instrument used in Study 1. The reliabilities of the scales (αs) were .83 for Openness, .74 for Conscientiousness, .70 for Extraversion, .75 for Agreeableness, and .80 for Emotional Instability.

Socioeconomic Status (SES). Socioeconomic Status was assessed as in Study 1.

Analytical Approach

First, we computed the zero-order correlations among all the variables. Similar to Study 1, we computed a hierarchical regression model (M*plus* 7.11; FIML) in which final

grades in senior high school were predicted by academic grades at 8th grade, personality traits, gender, and SES on the first step (Model 1), and PB on the second step (Model 2). **We included the following observed variables: SES, gender, and academic grades in middle school (8th grade), and at the end of the senior school (13th grade). Big Five traits, intelligence and PB were modeled as latent variables, following the same procedure described in Study1. Differently from Study 1, PB was included as a latent factor defined by three indicators, namely, the three items of the scale.**

Results

Table 3 presents the means, standard deviations, and the zero-order correlations among the variables. Academic achievement at T1 and T2 were strongly correlated. Gender was positively related to academic achievement at both times, and to PB. SES showed moderate correlations with academic achievement at 8th grade and low correlations with PB, openness and agreeableness. Personality traits were mostly related each other. They were moderately related with PB and to academic achievement, excepted for Emotional Instability that was not significant. Openness, in particular, showed stronger correlations with achievement, compared to other traits. Finally, PB was significantly correlated with academic achievement.

Table 4 summarizes the results of hierarchical regression. **The model 1 showed moderate fit parameters (Chi-square = 107.94, *df* = 50, *p* = 0.001; CFI=.984; RMSEA = .038 (.029 - .048); SRMR = .020). On first step, 32.3% amount of variance of academic achievement at T2 was explained by our predictors (see Table 4). Specifically, higher grades at 8th grade, more openness, and being female predicted final grades at the end of senior high school. SES and the other four personality variables were not significant predictors. The model 2 showed moderate fit coefficient (Chi-square = 357.638, *df* = 83, *p* = 0.001; CFI = .942; RMSEA = .064 (.057 - .071) SRMR = .037). On second step, PB**

significantly increased the explained variance, ΔR^2 = 1.7%; *p*=.032. More PB predicted later higher final grades.

Finally, we conducted a sensitivity analysis in which we repeated the same regression model in a path analytic framework with the reduced sample (*N* = 334) in which missing data were not included. **The results were almost the same and only academic achievement at 8th grade, B = .254=, *β* = 351, *p* = .000; gender, B = .250, *β* =.096; *p* =.049 openness, B = .255, *β* =.144, *p* = .049; PB, B = .1.329, *β* = .137, *p* =.014; significantly predicted later academic achievement. Extraversion was not a significant predictor, B = .092, *β* =.048; *p* = .353.**

General Discussion

Our findings provide new information regarding the potential short- and long-term positive associations between PB and academic attainment at the end of middle and senior high school, two critical school moments for adolescents' life. In fact, in Italy, at the end of middle school, students individually choose the academic paths they will follow for the first time, and their academic achievement is determining their future trajectories, as found in US (ACT, 2008). Similarly, students' final grades in senior high school are predictive of youths' entrance into college, and persistence and results at college (Westrich et al., 2015), as well as their earnings in adulthood (French et al., 2015).

In our two samples, PB appeared to be a strength and a resource for adolescents' development. PB accounted for the unique prediction of academic results, above and beyond previous academic achievement, gender, socio-economic status, personality traits and cognitive abilities (at short term). Being prosocial in adolescence, as corroborated at earlier ages (e.g., Caprara et al., 2000; Miles & Stipek, 2006), appeared to give students a greater chance to success at school. However, the data are essentially correlational, so we cannot definitively test causal relations, despite controlling for prior grades.

Overall, inter-individual differences in academic grades were consistently stable across one and five years, during middle school and from middle to the end of senior high school, in accordance with findings attesting to the determinant role of middle school grades in predicting later students' attainment (ACT, 2008). So, as expected, adolescents' school attainments in middle school seems to set substantially, but not completely account for, adolescents' future academic attainment. In fact, despite the stability in grades, students' peer-reported prosocial behavior in middle school further predicted academic achievement in the short- and long-term (i.e., in 8th and the 13th grade respectively). This finding is overall robust, replicated in two different samples and after controlling for a variety of socio-structural and individual variables. It appears that peers' perceptions of how prosocial a classmate is, may have important implications for doing well academically in school. This is consistent with the hypothesis that prosocial behavior contributes to better grades by fostering networks of positive relationships within the classroom (Wentzel, 1993). Prosocial students, in fact, have more reciprocal friends, more secure attachment with peers (Laible, 2007), are more popular (Wentzel, 2003), and are part of more popular cliques (Closson, 2009). Thus, adolescents who are evaluated prosocial may experience a supportive social and learning environment in which they feel accepted and helped by their classmates, as well as by their teachers (e.g., Jennings & Greenberg 2009; Wentzel 1993). In turn, supportive relationship with teachers likely contribute to stronger engagement with school (Wentzel, 1993). Higher quality relationships within the classroom like are particularly helpful for students' motivation, especially during senior high school. During those years, in fact, the school environment is usually less supportive than in earlier years, teachers are more distant, academic request are higher, and, academic results, school engagement and school bonding tend to be lower over time (Bryan, et al., 2012; Wang & Holcombe, 2010).

It is noteworthy that in both studies the relation between PB and school grades was found after controlling for personality traits, and, in particular, for agreeableness, the trait most related to PB. Other investigators that have found significant associations between agreeableness and academic functioning (Vermetten et al., 2001) suggested that agreeable students' behavior might contribute to a positive climate in classroom, that in turn could help student to receive more support. In our studies, more than the general disposition to be agreeable, helping, sharing and comforting behaviors recognized by peers seem to give students a greater chance for success at school.

In both the short and long-term, openness was the most consistent personality trait predicting academic performance. The longitudinal relevance for school grades of students' curiosity and interest in learning has been confirmed in other longitudinal studies (Caprara et al, 2011; Zuffianò et al., 2013). More open students tend to have more resources and are more curious, they use more critical thinking, achieve deeper learning, are more task-oriented, and maintain high levels of learning motivation (e.g., Tempelaar, Gijselaers, van der Loeff, & Nijhuis, 2007; Vermetten, Lodewijks, & Vermunt, 2001).

In addition, we found that extraversion predicted grades only in the short term, from 7th to 8th grade, but not at the end of high school. This negative association has been found in others studies (e.g., Rolfhus & Ackerman, 1999; Laidra, Pullman & Allik, 2006). It is likely that more extraverted youths spend more time socializing rather than studying (Poropat, 2009), and this could contribute negatively to their academic results in junior high. Overall, literature on this point has produced mixed results regarding the degree to which extraversion is associated with youths' academic achievement (Poropat, 2009).

Unexpectedly, conscientiousness and intelligence did not predict academic grades. A variety of factors may have accounted for this lack of prediction. First, in our studies, conscientiousness and intelligence were significantly but moderately correlated

with academic achievement, and were associated with openness, the strongest correlate of academic achievement. Thus, some of the association of conscientiousness and intelligence with grades may not have been unique from the associations of other predictors with grades. Secondly, in contrast to other longitudinal studies (see Poropat, 2009, Roth et al., 2015), we controlled for the stability of grades, which were fairly stable, especially in the short term. Furthermore, with regard to conscientiousness, the period of our assessment (age 13–14 years) is a period in which this trait may be particularly susceptible to change. In particular, in recent studies (Denissen, van Aken, Penke, &Wood, 2013; Tackman, Srivastava, Pfeifer, & Dapretto, 2016), researchers have found conscientiousness decreases from late childhood through age 13 and increases in later adolescence years, and those variations are associated to change in academic grades (Tackman et al., 2016). Thus, individual differences in these nonlinear changes in conscientiousness in adolescence may make it more difficult to identify a linear relation. With regards to intelligence, in our studies, the Culture Fairs (Cattel & Cattel, 1987) showed reliability slightly lower than in other studies (see Roth et al., 2015), but similar to that found in other Italian studies (.79 and .81; Vecchione, Alessandri, & Marsicano, 2014). In this study, the association between intelligence and academic grades was also lower compared to Roth et al.'s (2015) meta-analysis. Therefore, further studies are needed to clarify which of the mentioned factors may account for conscientiousness and intelligence being related to grades in zero-order correlations but not in the models.

Agreeableness and emotional instability also did not significantly predict grades. These findings were partially expected, considering the limited numbers of studies corroborating significant associations between those traits and academic achievement (Poropat, 2009). However, it is noteworthy that the absence of prediction

by agreeableness supports the view it was not students' general positive interpersonal dispositions or attitudes (e.g., cooperativeness, gentleness, politeness) that provided unique prediction of school success, but specific behaviors, such as helping, caring, and sharing.

Finally, among socio-demographic variables, it was found that girls had an academic advantage at the end of senior high school, beyond previous grades at the end of middle school, in accordance with other findings showing that girls obtained better grades at school (see Voyer & Voyer, 2014). In contrast, no unique contribution was found for socio-economic status. **With regard to the long-term study, we examined only students who attended regular high school (neither vocational schools nor drop-out students were included). Students who drop-out are usually from lower SES (Sirin, 2005), as are students who attend vocational schools (INVALSI, 2012*).* Indeed, in our sample, students who did not attend senior high school had a lower SES than students who attended it (in ANOVA, Cohen's d=.69). Thus, in our analysis, we probably did not include many students from the lowest SES, and this could have reduced the prediction of grades from SES. In addition, in both studies, SES correlated especially with openness, which was the strongest predictor of grades, and this could have further reduced the unique prediction of grades by SES.**

Strengths of this article include the use of two longitudinal samples to examine and replicate relations across two different time spans, the use of a variety of methods (peer reports, self-reports, school data for grades), and the use of non-North American samples. Nonetheless, our study has some limitations. **Our measure of intelligence showed an acceptable but lower reliability, compared with the reliability reported in the manual (Cattel & Cattel, 1987)**. Robust statistics were used to deal with missing data, but we cannot exclude the possibility that in the second study, missingness may have partially influenced

the estimation of our results. With regard to the long-term predictive effect of PB in Study 2, given the association of cognitive abilities with school grades (Roth et al., 2015) and openness (e.g., Ackerman & Heggestad, 1997), it is reasonable that by controlling for previous academic achievement and for openness, we partially controlled for students' cognitive abilities. However, further research is needed to verify the long-term relation between prosocial behavior and academic achievement when controlling for intelligence.

Moreover, we focused only on personal variables likely to affect academic achievement, but other interpersonal variables need to be taken into account, such as teacher–student relationship (Jennings & Greenberg, 2009). Future research should clarify the mediating mechanisms linking prosocial behavior to academic attainments, such as the role of teacher–student relationship and peer acceptance, or positive school climate. Moreover, as previously noted, because our data are essentially correlational (albeit longitudinal and including earlier grades) and PB explained only a limited percentage of additional variance, experimental research verifying the role of PB in students' academic success is needed.

Despite the limits, our findings indicate the need for further examination of the role of adolescents' helping, sharing, and comforting behaviors in their later academic adjustment. Effective school-based interventions designed to increase prosocial behavior in middle school (e.g., Caprara, Luengo Kanacri, Zuffianò, Gerbino, & Pastorelli, 2015) are available and may affect adolescents' academic achievement. **Thus, our findings are of potential relevance for teachers' and educators' policies and classroom practices**.

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Footnote

1. As a check on students' reports of their high school grades, we compared the self-reported grades for a sample of 30 students against the grades recorded by the schools. In 29 of the 30 students, the self-reported grade was identical with the recorded school grades. The discrepancy for one student was small.

Table 1.

Descriptive Statistics, Correlations of Variables from the Study 1

		1	2	3	4	5	6	7	8	9	10	11
1. Gender	r	-										
	95% C.I.	-										
	p	-										
2.SES	*r*	.005	-									
	95% C.I.	[-.149, .158]	-									
	p	.956	-									
3. Int	*r*	.087	.045	-								
	95% C.I.	[-.074, .125]	[-.132, .219]	-								
	p	.294	.622	-								
4. C	*r*	.253	-.057	-.172	-							
	95% C.I.	[.104, .391]	[-.230, .112]	[-.324, -.011]	-							
	p	.001	.526	.037	-							
5. O	*r*	.142	.195	.174	.406	-						
	95% C.I.	[-.011, .288]	[.020, .358]	[.014, .326]	[.270, .526]	-						
	p	.069	.030	.034	.000	-						
6. E	*r*	.054	.094	-.106	.217	.102	-					
	95% C.I.	[-.100, .205]	[-.083, .265]	[-.262, .056]	[.066, .358]	[-.051, .251]	-					
	p	.489	.298	.200	.005	.194	-					
7. A	*r*	.241	-.007	-.047	.406	.299	.469	-				
	95% C.I.	[.092, .380]	[-.183, .169]	[-.206, .115]	[.270, .526]	[.153, .432]	[.341, .580]	-				
	p	.002	.940	.569	.000	.000	.000	-				

8. EI	*r*	-.039	-.027	.132	-.289	-.304	-.318	-.348	-			
	95% C.I.	[-.191, .114]	[-.202, .150]	[-.029, .287]	[-.423, -.123]	[-.436, -.159]	[-.174, -.449]	[-.475, -206]	-			
	p	.619	.769	.111	.000	.000	.000	.000	-			
9. PB	*r*	.393	.149	.128	.119	.112	.209	.224	-.088	-		
	95% C.I.	[.256, .515]	[-.028, .316]	[-.034, .283]	[-.034, .267]	[-.041, .260]	[058, .351]	[.074, .364]	[-.238, .066]	-		
	p	.000	.099	.119	.130	.152	.007	.004	.262	-		
10. A_Ac6	*r*	.162	.284	.247	.165	.515	.012	.121	-.182	.416	-	
	95% C.I.	[.009, .307]	[.114, .438]	[.090, .392]	[.010, .310]	[.393, .619]	[-.141, .165]	[-.033, .269]	[-.326, -.030]	[.281, .535]	-	
	p	.038	.001	.002	.036	.000	.883	.123	.020	.000	-	
11. A_Ac8	*r*	.144	.230	.313	.230	.567	-.073	.115	-.166	.373	.744	-
	95% C.I.	[-.009, .290]	[.056, .390]	[.160, .451]	[.080, .370]	[.453, .662]	[-.224, .081]	[-.039, .264]	[-.311, -.013]	[.233, .498]	[.667, .805]	-
	p	.066	.010	.000	.003	.000	.352	.143	.034	.000	.000	-
Mean		-	- .004	30.178	3.452	3.458	4.290	3.357	2.626	2.898	7.538	7.103
SD		-	.344	4.693	.746	.717	.633	.636	.796	.571	1.229	.957

Note. Gender: boys =0; girls=1; SES = Socioeconomic Status; Int = Intelligence; C = Coscientiousness; O = Openness; E = Extraversion; A = Agreeableness; EI = Emotional Instability; Int = Intelligence; PB = Prosocial Behavior; A_Ac6 = Academic Achievement at 6th grade; A_Ac8 = Academic Achievement at 8th grade; r= correlation coefficients; 95% CI = 95% confidence intervals of *r*.

Table 2.

Results of Hierarchical Regression Analysis with Academic Achievement at Eighth Grade as Dependent Variable

	Model 1			Model 2		
Variables	B (β)	95% CI	p	B (β)	95% CI	P
Gender	-.028 (.015)	[-.142, .204]	.788	-.070 (-.037)	[-.258, .121]	.541
A_Ac6	.433 (.554)	[.354, .513]	.000	.387 (.496)	[.305, .473]	.000
SES	-.020 (-.007)	[-.314, .272]	.914	.042 (-.015)	[-.338, .247]	.817
Int	.027 (.124)	[-.011, .064]	.267	.025 (.115)	[-.014, .064]	.322
C	.059 (.042)	[-.177, - .286]	.684	.031 (.022)	[-.212, .271]	.839
O	.508 (.333)	[.217, .823]	.008	.562 (.372)	[.268, .866]	.003
E	-.302 (-.160)	[-.522, -.048]	.040	-.318 (-.170)	[-.539, -.069]	.031
A	.072 (.042)	[-.179, .311]	.638	.046 (.027)	[-.198, .298]	.766
EI	.043 (.035)	[-.074, .160]	.545	.037 (.029)	[-.086, .157]	.624
PB				.226 (.141)	[.022, .420]	.066
$AdjR^2$	.	.708			.720	

Note. Gender: boys =0; girls=1; A_Ac6= Academic Achievement at 6^{th} grade; C = Conscientiousness; O = Openness; E = Extraversion; A = Agreeableness; EI = Emotional Instability; Int = Intelligence; PB = Prosocial Behavior; B = unstandardized regression coefficient, as observed across N = 5.000 bootstrapped samples; 95% CI = 95% bias-corrected bootstrap-based confidence intervals of B; β = standardized regression coefficient, as observed across bootstrapped samples; CI = 95% bias-corrected bootstrap-based confidence intervals of *B*.

Table 3.

Descriptive Statistics and Correlations of Variables from the Study 2

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.Gender	r	-									
	95% C.I.	-									
	p	-									
2.SES	*r*	.018	-								
	95% C.I.	[-.050, -.086]	-								
	p	.634	-								
3. C	*r*	.186	- .027	-							
	95% C.I.	[.115, .225]	[-.108, .102]	-							
	p	.000	.464	-							
4. O	*r*	.051	.123	.433	-						
	95% C.I.	[.019, .120]	[.050, .194]	[.375, .488]	-						
	p	.158	.001	.000	-						
5. E	*r*	.097	.029	.311	.440	-					
	95% C.I.	[.027, .166]	[-.044, .102]	[.247, .373]	[.382, .495]	-					
	p	.007	.447	.000	.000	-					
6. A	*r*	.243	.095	.518	.421	.436	-				
	95% C.I.	[.176, .308]	[.022, .167]	[.465, .567]	[.362, .477]	[.378, .491]	-				
	p	.000	.011	.000	.000	.000	-				
7. EI	*r*	.066	-.039	-.108	-.123	-.116	-.053	-			
	95% C.I.	[-.004, .135]	[-.111, .034]	[-.176, -.038]	[-.190, -.054]	[-.184, -.046]	[-.125, -.015]	-			
	p	.064	.293	.003	.001	.001	.140	-			
8. PB	*r*	.243	.138	.173	.275	.135	.248	-.025	-		
	95% C.I.	[.177, .307]	[.066, .209]	[.104, .241]	[.208, .339]	[.065, .204]	[.180, .313]	[-.095, -.117]	-		

	p	.000	.000	.000	.000	.000	.000	.498	-		
9. A_Ac8	*r*	.167	.284	.194	.544	.137	.247	-.047	.419	-	
	95% C.I.	[.100, .233]	[.216, .349]	[.126, .260]	[.493, .591]	[.068, .205]	[.180, .312]	[-.116, .023]	[-.095, .045]	-	
	p	.000	.000	.000	.000	.000	.000	.186	.000	-	
10. A_Ac13	*r*	.140	-.016	.159	.346	.077	.161	-.023	.301	.484	-
	95% C.I.	[.034, .243]	[-.093, .125]	[.052, .263]	[.247, .438]	[-.032, .184]	[.053, .265]	[-.130, .085]	[.200, .396]	[.398, .562]	-
	p	.010	.774	.004	.000	.168	.004	.676	.000	.000	.-
Mean		-	0.113	3.381	3.598	4.130	3.319	2.860	0.109	78.380	0.113
SD		-	1.005	.791	.755	.657	.691	.810	.985	12.663	1.005

Note. Gender: boys =0; girls=1; SES=Socioeconomic Status; C = Conscientiousness; O = Openness; E= Extraversion; A = Agreeableness; EI = Emotional Instability; A_Ac8 = Academic Achievement at 8th grade; A_Ac13 = Academic Achievement at 13th grade; *r* = correlation coefficient; 95% CI = 95% confidence intervals of *r*.

Table 4.

Results of Hierarchical Regression Analysis with Academic Achievement at 13th Grade as Dependent Variable

	Model 1			Model 2		
Variables	*B* (*β*)	95% CI	*p*	*B* (*β*)	95% CI	*p*
Gender	-.330 (.126)	[-.117, -.559]	.015	.278 (.107)	[.056, .499]	.040
A_Ac8	.540 (.406)	[.368, .712]	.000	.436 (.329)	[.244, .614]	.000
SES	-.085 (-.057)	[-.210, .043]	.263	-.078 (-.053)	[-.199, .048]	.292
C	.026 (.013)	[-.286, .332]	.892	.027 (.014)	[-.268, .336]	.883
O	.458 (.244)	[.103, .817]	.038	.483 (.258)	[.139, .851]	.027
E	-.213 (-.097)	[-.489, .053]	.198	-.203 (.093)	[-.476, .053]	.210
A	-.102 (-.047)	[-.492, .288]	.672	-.198 (-.091)	[-.595, .188]	.408
EI	-.044 (-.025)	[-.182, .104]	.615	-.034 (-.019)	[-.173, .115]	.689
PB				.185 (.157)	[.053, .336]	.032
$AdjR^2$	.323			.340	.	

Note. Gender: boys =0; girls=1; A_Ac6 = Academic Achievement at 8th grade; SES=Socioeconomic Status; C = Conscientiousness; O = Openness; E = Extraversion; A = Agreeableness; EI = Emotional Instability; Int = Intelligence; PB = Prosocial Behavior; B = Unstandardized regression coefficient, as observed across N = 5.000 bootstrapped samples; 95% CI = 95% bias-corrected bootstrap-based confidence intervals; β = standardized regression coefficient, as observed across bootstrapped samples; CI = 95% bias-corrected bootstrap-based confidence intervals of *B*.