How HEXACO personality traits are involved in school performance of middle school adolescents (10–14 years)

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A B S T R A C T

This paper aimed at investigating the relationship between HEXACO personality traits and academic performance in two samples of Italian 10–14 years old middle-school adolescents ($N = 714$ and $N = 1093$) using Multilevel Mixed Models. The main results show that: 1) Conscientiousness and Openness to Experience were the most important predictors of school performance, followed by Honesty-Humility; 2) a modest effect was present also for eXtraversion and Emotionality; 3) these influences occurred net of the influence of gender and class and could be generalized to male and female adolescents across 6th, 7th and 8th grade; 5) Perfectionism, Diligence and Prudence within Conscientiousness, Inquisitiveness within Openness, and Sincerity within Honesty-Humility were the facets more correlated with school performance; 6) results were replicated in two studies. Results are discussed and conclusions are drawn.

1. Introduction

Academic performance has long been a focal point of interest in the educational community. Academic performance typically refers to an individual's achievement or success in various educational endeavors, such as marks and test scores. It serves as an essential measure to evaluate students' knowledge, skills, and understanding of the curriculum. Numerous studies have examined factors that influence academic performance and sought to understand the complex interplay of various variables (e.g., Honicke & Broadbent, 2016; Klapp et al., 2023). The topics of success or failure in school have generated a substantial amount of research activity (Balkis, 2018; Covington, 2000). These investigations often explore not only the impact of cognitive abilities but also the role of non-cognitive factors, including individual aspects or personality traits. Understanding how personality traits relate to academic performance already in childhood/adolescence is highly relevant to educators and parents who care to know which children most likely need additional support to develop their full academic potential.

Several studies, within the Five-Factor Model (FFM; John & Srivastava, 1999; Costa Jr. & McCrae, 1992), have explored how various personality traits in young people are associated with school marks or academic outcomes. The combined results of Eisenberg et al. (2014), De Raad and Schouwenburg (1996), Poropat (2009), and Andersen et al. (2020) elucidate the positive influence of Conscientiousness on adolescent academic performance. This trait, marked by focused attention, organizational prowess, and inherent drive, significantly contributes to scholastic success. Poropat (2009) particularly underscores the importance of Conscientiousness, revealing a strong correlation with academic achievement, especially during adolescence. Additionally, Andersen et al.'s (2020) investigation across various grade levels confirms a consistent and robust link between Conscientiousness and academic success. An important role in academic success is also played by Openness to Experience (Chamorro-Premuzic & Furnham, 2009; Mervielde et al., 1995). Those with high Openness levels exhibit a broad perspective, engage in creative thinking, embrace diverse viewpoints, and actively seek intellectual challenges. These traits, highlighted by Vermetten et al. (2001), Tempelaar et al. (2007), and Bidjerano and Yun Dai (2007), significantly enhance learning approaches, motivation, and critical thinking development.

Allen et al. (2018) highlight Extroversion's indirect yet significant impact on academic performance, seen through enhanced collaboration, active group participation, and lively classroom engagement. De Raad and Schouwenburg (1996) further support this, noting Extroversion's positive influence due to the energy and positive learning attitude of

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extroverted individuals. However, Eysenck (1992) offers a nuanced view, suggesting that while highly extroverted students excel socially, they might risk prioritizing socializing over study time, potentially affecting academic performance. These varied perspectives reveal the intricate relationship between Extroversion and academic achievement.

The influence of Agreeableness on academic performance is varied and complex, as evidenced by research. De Raad and Schouwenburg (1996) suggest that Agreeableness can positively influence cooperation in learning environments, aiding in adherence to teacher instructions and maintaining focus, as noted by Vermetten et al. (2001). Conversely, study by Rothstein et al. (1994) suggests a negative link between Agreeableness and school performance. Borghans et al. (2008) add insight, proposing that Agreeableness improves interactions with teachers and classmates, potentially fostering a supportive environment for academic success.

Finally, concerning the last trait, adolescents with higher Emotional Stability exhibit traits such as perseverance, effective emotion management, and strong commitment to academic goals (Compas et al., 2001). This emotional regulation is closely linked to self-efficacy, as noted by Judge et al. (2002) and Robbins et al. (2004). The positive correlation between Emotional Stability and self-efficacy suggests that emotionally stable individuals often have greater confidence in achieving academic objectives.

Another widely used model in describing personality is the HEXACO model (Ashton et al., 2006; Ashton & Lee, 2007). The FFM and HEXACO models share similarities, but have key differences. The FFM proposes five personality dimensions: Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. In contrast, the HEXACO model adds a sixth factor, Honesty-Humility. While Extraversion, Conscientiousness, and Openness to Experience align with their FFM counterparts, HEXACO redefines Agreeableness and Neuroticism while introducing Honesty-Humility (Thielmann et al., 2020). HEXACO's Agreeableness excludes sentimentality and includes a (reversed) anger facet related to FFM's Neuroticism (Lee & Ashton, 2012). HEXACO's Emotionality includes emotional bonds and sentimentality but excludes anger (Lee & Ashton, 2013). Honesty-Humility reflects traits such as sincerity, fairness, modesty, and greed avoidance, distinct from FFM's Agreeableness (Ashton et al., 2014). Adjectives defining Honesty-Humility include honest, sincere, fair, modest, and, conversely, greedy, conceited, deceitful, and pretentious.

Different from FFM, the direct research on the relationship between HEXACO personality traits and school performance in adolescents is relatively limited (McAbee et al., 2014; Mottola et al., 2020; Sergi et al., 2020). As we have seen for the FFM, the same applies to the HEXACO model with Conscientiousness that is often associated with higher marks. Similarly, Openness to Experience may be linked to creativity and a keen interest in learning, which can have a positive impact on academic results (Ashton et al., 2014). Some studies suggest that a high level of Honesty-Humility can promote ethical and responsible study behaviors, thereby influencing academic outcomes. This factor is defined, for example, by tendencies to avoid manipulating other people for personal interests and to avoid breaking rules. Furthermore, de Vries and colleagues suggested that academic criteria may be predicted with greater accuracy by traits of Conscientiousness and Honesty–Humility (de Vries et al., 2011). Note that these studies have investigated the personality in adolescence (11–17 years old) using the adult version of the HEXACO. Indeed, this lack of studies is justified by the fact that only recently has a personality inventory based on the HEXACO model specifically designed for the 10–14 age group been developed (Sergi et al., 2020) and perfected as an extended version (Gnisci et al., 2023; Mottola et al., 2023).

Two recent studies showed that three factors – Conscientiousness, Honesty-Humility and, to a lesser extent, eXtraversion – were strongly related to school performance (Mottola et al., 2020; Sergi et al., 2020). Interestingly, both studies (Mottola et al., 2020; Sergi et al., 2020) examined marks across different subjects, not only the overall mark (e.

g., the average one), thereby providing more comprehensive insights into the relationship between personality traits and academic performance. In particular, Conscientiousness predicted the marks for humanistic and scientific subjects, and for subjects such as Music, Musical Instrument and Physical Education. Moreover, it was a good predictor of the average mark and the admission mark to the exam for middle school diploma. Honesty-Humility was also a good predictor of school performance considering both humanistic and scientific subjects, and other subjects, for example, Music and Musical Instrument. Extraversion predicted only some marks, i.e., humanistic and scientific subjects, Physical Education and the average mark. Instead, Agreeableness, in both studies, negatively predicted the marks for Italian and Geography subjects. Emotionality predicted, in the first study (Sergi et al., 2020), only the mark for Musical Instrument subject while, in the second study (Mottola et al., 2020), the mark for Musical Instrument and the admission mark to the exam for middle school diploma. Finally, in Sergi and colleagues' study (2020), Openness to Experience predicted only the mark for Music subject; while, in Mottola et al. (2020)' study, it no longer predicted any marks. Despite the interesting results for students' academic performance in different subject areas, studies also suggest the existence of a 'G factor', that is a latent variable that explains the correlations among a diverse set of school subjects (Pokropek et al., 2022) supporting that performance in a specific school subject tends to be correlated with performance in another.

We have seen some evidence according to which personality may play a key role in academic performance. However, few studies have studied if these results remain stable when other variables as sex and age or grade are considered. The limited studies report inconsistent results (Branje et al., 2007; McCrae et al., 2002; McCrae et al., 2005). Hence, due to the lack of a comprehensive understanding of their influence, it is recommended to incorporate these variables as covariates or moderators in the analyses of the effects of personality traits of adolescents on academic performance.

1.1. Aims and research questions

This paper presents two studies, the second being a replication of the first with a larger sample. Both samples come from a broader research project that has led to the development and validation of the HEXACO-MSI-E (Gnisci et al., 2023; Mottola et al., 2023). In this contribution, together with the scores of the HEXACO-MSI-E, we will analyze different variables not investigated in the other studies, such as grade, class, and marks. Therefore, analyses and results are completely novel. The general aim of this paper is investigating the relationship between personality traits according to the HEXACO model and academic performance collected by marks in two studies on two large samples of middle-school adolescents (10–14 years old). To estimate the relationships among the measured variables, we use Multilevel Mixed Models, that allowed taking into the account the variability across classes, therefore providing a more accurate picture of estimation of the effects.

Our specific research questions are as follows:

1) Are personality traits in adolescents associated with school performance? Do HEXACO personality traits of adolescents predict general performance at school and each specific mark in each single subject matter? If we find evidence that some traits predict school performance, we want, first, to check the stability of the results when sex and grade are added as covariates and, second, to check if the results are generalizable to males and females and to the three different grades students, i.e., 6th, 7th and 8th (cross-validation; presented in SM).

2) Assuming that some traits of personality predict school marks (previous research question), what facets of personality traits are associated with overall academic performance? Are there particular aspects within each dimension that have a stronger impact on academic performance or do all the facets within a dimension contribute

similarly to school performance? We will answer this question, using correlations between the 24 HEXACO facets and general school performance (we will also provide regression models of the facets on the general performance in SM, controlling for sex and grade as covariates).

2. Study 1

2.1. Method

2.1.1. Participants

Participants were 714 middle school students (52.7 % Females, Mean age = 11.94, SD = 0.91, range = 10–14) recruited from seven schools of Campania (Italy), 47.8 % attending the 6th, 34.6 % the 7th and 17.6 % the 8th grade. Information on the education and profession of the parents are presented in Table A of the SM.

2.1.2. Procedures

Recruitment and Informed Consent. The research plan received approval from the local Ethics Committee of the first author's Department (approval number 13/26.05.2020). Then, it was approved by the Directors of the schools and by their Councils, which culminated in a formal informed consensus, signed by the Directors. Parents and adolescents were informed about the study by the school, by the research assistant, by written instructions, and by video- and audio-recordings, specially prepared. After being informed, the parents/legal guardians were administered (online) the protocol, at the beginning of which they read the basic information related to the research and then provided, if they desired, the consent to the participation for their children and then for themselves. At the beginning of their online protocol, the adolescents also read a written description of the research and were asked about their willingness to participate in the research. The adolescents and their parents were informed that they were free to decline to take part in data collection at any time and without any consequence. It was also specified that the responses were recorded anonymously, and data were treated collectively.

According to our initial intentions, we wanted to administer the HEXACO inventory during the 2nd semester (as we did) and to obtain the marks of each student at the end of the academic year (i.e., the end of the 2nd semester) and then use a regression approach to predict marks by personality traits. However, just in the 2nd semester, the Italian government imposed many restrictions, including the lockdown (that was particularly dramatic given Italy was the first Occidental country to be strongly affected by the COVID-19 crisis). In a climate of great bewilderment and uncertainty, it was realized that the assessment of school performance at the end of the year would be affected by the lockdown and distance learning, especially as many journalistic and government sources suggested suspending the assessment (e.g., confirming the marks of the first semester, promote all students). We, therefore, decided to ask the schools for the marks of the 1st semester as they were genuine (i.e., based on a real evaluation of the performance of the students by the teachers) rather than the ones of the 2nd. The protocol (including HEXACO inventory for adolescents) filled out by adolescents, and their first semester marks were associated through an alphanumeric code generated by each participant on the basis of general questions to guarantee anonymity.

Administration. Data collection took place between May and June 2020, right after the so-called first lockdown imposed by the government in Italy due to the COVID-19 pandemic. Participants completed an online protocol using the Qualtrics platform. In accordance with the ministerial indications, the participating schools provided distance education, using online platforms, with the activation of virtual classrooms to guarantee the continuity of students' learning. For this reason, adolescents were administered the online protocol in their virtual classrooms by research assistants and in the presence of the teacher. Given the large number of items, students completed it in two sessions on

average 1.4 (SD = 0.69) days apart (97.8 % ≤ 2 days). Marks were anonymously communicated to the researcher after data collection and referred to the final marks of the first semester.

2.1.3. Measures

Demographic Information. At the beginning of the protocol, basic information such as sex, age, school, grade, class, and information on parents (i.e., educational level and professional status) were requested. Sex represented biological sex assigned at birth, Grade asked the adolescents if they were frequenting 6th, 7th or 8th grade, Class was each specific group of adolescents who followed the same lessons in the same classroom taught by certain professors. Thus, within any grade, students belonged to many different classes. We will use the variable Sex and Grade in some analyses as covariates or moderators (note that age and grade were strongly and significantly correlated: $N = 714$, $r = 0.84$, $p < .001$).

HEXACO-MSI-E. We administered an initial version of HEXACO-MSI-E formed by 384 items, from which we derived the final 190-item scale used here in Study 1 (see Gnisci et al., 2023). The HEXACO-MSI scale used in Study 1 measured the six broad personality dimensions: Honesty-Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to Experience. Adolescents were asked to indicate the extent to which they agreed that each statement described them, using a 5-point scale from 1 (*True*) to 5 (*False*). We found that few traits were correlated (average $r = 0.27$, SD = 0.13), ranging from |0.10| (X vs E) to |0.53| (H vs A). (The definitive HEXACO-MSI-E inventory can be downloaded from https://www.psicologia.unicampania.it/home-emerge/27-emerge/1558-home-emerge-en). Cronbach's α (already reported in Gnisci et al., 2023) was 0.88, 0.85, 0.91, 0.90, 0.92 and 0.88 for H, E, X, A, C and O. Instead, for facets, it ranged from 0.44 (for Unconventionality) to 0.85 (for Social Self-Esteem and Organization).

School Marks. Schools agreed to anonymously provide us with the marks of each student at the end of the 1st semester (January 2020). They were associated with the HEXACO inventory by an anonymous code. In the Italian system, marks are based on teachers' evaluation of the students on each subject matter, using a numerical scale from 0 to 10 (the threshold for sufficiency is represented by 6). Subject matters were: Italian, History, Geography, Mathematics, Science, Technology, Music, Art, Physical Education, English (first foreign language), and French (second foreign language). In addition, after factor analysis (see below), the factor score of the solution was used as a summary variable for academic or scholastic performance.

The protocol used included other measures that we did not consider in this contribution.

2.1.4. Data analysis

Before addressing the first research question, we inspected the correlation matrix between all the marks in each subject matter (see Table B in SM) and executed a Principal Component Analysis (PCA) with SPSS assuming a factor structure as constant across grades. Once we established reliability by Cronbach's α, we finally obtained the factor score with Regression Method to be used in the following analyses. All along the text, this factor will be labelled SP, standing for Scholastic Performance.

All the analyses for verifying the research questions were conducted using Linear Mixed Models, comprising fixed effects and random effects (McCulloch & Searle, 2001). The fixed effects were composed of the fixed intercepts, the effects of individual predictors. Random effects were defined across classes as random intercepts and random slopes of the predictors. All continuous predictors were cluster-centered, so each participant score was centered using the participant class mean. All models were estimated using restricted maximum likelihood, with Satterthwaite approximation for the degrees of freedom. The F tests were evaluated for obtaining statistical significance (West et al., 2006). Goodness of fit of the models was evaluated in terms of variance explained, for the whole model with the conditional R-square

(hereinafter R_c^2) and for the fixed effect with the marginal R-square (R_m^2) (Nakagawa et al., 2017). All the analyses were performed with *R* if not otherwise specified.

For the first research question, we, first, analyzed the correlations of traits with Marks and SP. Here, we will present Multilevel correlations (and in SM Pearson correlations). Second, the effect of the six traits on SP was estimated with a Mixed Model, with Class as clustering variable. A preliminary analysis was conducted with SP to determine the most adequate random structure. To disentangle individual effects from group effects, continuous independent variables of personality traits have been centered to the cluster mean. The analysis was executed in two steps: we, first, entered as predictors only the six HEXACO personality traits (Step 1); then, together with the traits, we entered Sex and Grade as covariates (Step 2). Third, the effect of the HEXACO personality traits on each mark of each subject matter was estimated with a Mixed Model, with Class as clustering variable. The preliminary analyses showed that the random intercepts and the effect of X trait showed non-zero variances, whereas all other effects did not show any variance across Class. Therefore, for all marks, a model with random intercept and random slope of X was estimated. To disentangle individual effects from group effects, continuous independent variables of personality traits have been centered on the cluster mean. Finally, a separate analysis of Mixed Model moderation of the relation between traits and SP by Sex and Grade was conducted (reported in SM) as a test of generalization of the preceding found results (cross-validation across males and females and by 6th, 7th and 8th grade).

For the second research question, the correlation of the 24 facets and SP was estimated with a Mixed Model, with Class as clustering variable (Pearson correlations in SM). For each pair, both variables are standardized within clusters, and the slope has been set as fixed and random coefficient. We decided to focus primarily on the correlations between facets and SP rather than on regression because the facets within each dimension are expected to be substantially correlated, hence raising the issue of multicollinearity and the consequent frailty of the specific parameter estimates. Nonetheless, readers interested in the results of a regression model approach can find them in the SM.

All the analyses were corrected for multiple testing using False Discovery Test (Benjamini & Hochberg, 1995), as specified in the results and in the tables.

2.2. Results

2.2.1. What is the relation between HEXACO personality traits and marks of adolescents at the end of the first semester?

Previous studies showed that marks in each subject matter can be subsumed by a general underlining factor. Therefore, we tried to understand if in our data this general factor can be recovered, which would allow us hereafter to work with the resulting Factor Score and therefore simplify substantially some analyses.

First, we examined the correlations of all the marks. Pearson and Multilevel correlations are shown in Table B (Study 1) of the SM. All the correlations were significant and positive. In the Multilevel correlations, the lowest correlation was found between History and Physical Education (0.28), the highest between SP and Italian (0.89). Second, we performed a Principal Component Analysis (PCA) on all the marks. As expected, based on literature and qualitative reading of correlations, the PCA on the eleven marks provided a mono-factorial solution with a single dimension explaining 64.47 % of the total variance. All the items saturated on the dimension. The highest loading was found for Italian (0.90) and the lowest for Physical Education (0.63). Third, as far as reliability concerns, Cronbach's α was 0.95.

Once established that a single factor well represented all the marks, we saved the factor score as SP. To understand the relationships between HEXACO traits of adolescents and marks, including the factor score of performance, we, first, correlated them and then we regressed the traits on the marks as targets.

In Table 1 (Study 1), we reported Multilevel correlations given they are more accurate in terms of distribution of variance than Pearson correlations (these latter can be found in Table C of the SM). Note, in any case, that the two tables are very similar in terms of sign and intensity of correlations. Given that all the significant correlations were always positive, for simplicity, we will not underline it each time in the following description of results.

C and O were the best correlated to marks. They correlated with all the marks in each subject matter. The intensity of correlations was slightly higher for C ($r = 0.40$ for SP) than O ($r = 0.36$). The third important trait correlated with all the twelve marks was H with a lower intensity ($r = 0.19$ for SP). The fourth trait correlated with the marks was E, which provided nine significant correlations, ranging from a minimum of 0.09 (Mathematics, Science and Art) to a maximum of 0.17 (French), with a significant correlation with SP equal to 0.11. X significantly correlated five times with marks (SP, Italian, Geography, Science and Physical Education). The significant correlation between X and SP was 0.09. Finally, A significantly correlated with marks only once (Physical Education, $r = 0.11$), being therefore the less influential trait ($r = 0.04$ with SP, not significant).

After having analyzed correlations between traits and marks, we executed twelve Mixed Models with the HEXACO traits as predictors and the marks or SP as targets. Only for the last, we controlled also for Sex and Grade.

We present, first, the last analysis. In the first step, we inserted only HEXACO personality traits in the Multilevel regression, in the second, also the Sex and Grade to understand if the influences identified at the step one remained when the last two variables were used as covariates.

The statistics are shown in Table 2 (Study 1). When HEXACO personality traits predicted SP (Step 1), the variance explained by the model was 44 % (R_c^2) and the one by the fixed effects 16 % (R_m^2). The significant predictive traits of SP were, in order of their strength, C, O and A, with A negatively related to SP. The same occurred when covariates were entered in the regression (Step 2), with Sex and Grade not significantly related to the SP.

If we consider the marks in each subject matter (Table 3), the explained variance ranged from 28 % to 47 % (R_c^2) and the variance explained by the fixed effects from 2 % to 14 % (R_m^2). Only three traits emerged as strong predictors of all marks apart from Physical Education: O and C significantly and positively while A significantly and negatively. Three sporadic correlations connected significantly other traits to marks: H predicted with lower values only two subject matters (History and Geography) while E only French. Finally, X never predicted marks.

In order to prove generalizability of results across sex and grades, SM presents results on whether sex (Table D) and grades (Table E) moderated the relationship between HEXACO personality traits and SP. Although two significant interactions arose for Sex (C*Sex and O*Sex), whose analyses are reported in Box 1 and 2 of the SM respectively, in general, the results were generalizable to males and females and to the three different grades.

2.2.2. Which facets did correlate with the general school performance?

We correlated the 24 facets of the dimensions of the HEXACO-MSI-E with SP. We will describe the results of Mixed Models shown in Table 4 (Study 1) (simple Pearson correlations of traits with marks and SP are reported in Table F of SM). All the facets of C, O and H positively and significantly (after FDR correction for multiple testing) correlated with SP. Moreover, Social Boldness from X (0.14) and Anxiety from E (0.11) positively correlated with SP. Within C, the most correlated with SP was the facet of Diligence (0.51), the least was Organization (0.15). Within O, the most correlated was Inquisitiveness (0.35) while the other three facets correlated less and with similar intensity with SP (>0.20). Within H, the most correlated was Sincerity while the remaining three correlated similarly with SP (>0.10).

An overall discussion of the results of Study 1 will be presented later together with the results of Study 2.

Table 1

Correlations estimated with a mixed model with Class as clustering variable between the six HEXACO-MSI traits and each mark at the end of the first semester in Study 1 and of the second semester in Study 2.

(a) Study 1	HEXACO-MSI					
Subject matters	H	E	X	A	C	O
SP ($N = 684$)	0.192***	0.108**	0.092*	0.044	0.395***	0.360***
Italian ($N = 680$)	0.154**	0.116**	0.097*	−0.003	0.357***	0.341***
History ($N = 675$)	0.159***	0.061	0.076	0.038	0.249***	0.251***
Geography ($N = 682$)	0.217***	0.075	0.106*	0.085	0.364***	0.308***
Mathematics ($N = 682$)	0.139**	0.092*	0.079	0.014	0.354***	0.289***
Science ($N = 682$)	0.164***	0.093*	0.108**	0.048	0.360***	0.331***
Technology ($N = 678$)	0.134**	0.106*	0.033	0.041	0.330***	0.296***
Music ($N = 659$)	0.105*	0.127**	0.002	−0.018	0.264***	0.284***
Art ($N = 641$)	0.131**	0.092*	0.062	0.046	0.307***	0.327***
Physical Education ($N = 644$)	0.126*	−0.037	0.119*	0.110*	0.150**	0.153***
English ($N = 680$)	0.153**	0.117**	0.036	0.000	0.322***	0.300***
French ($N = 562$)	0.229***	0.169***	0.096	0.080	0.383***	0.293***
(b) Study 2						
SP ($N = 1091$)	0.162***	0.107**	0.123**	0.063	0.421***	0.309***
Italian ($N = 1086$)	0.155***	0.098**	0.105**	0.044	0.390***	0.284***
History ($N = 1085$)	0.128***	0.088*	0.130**	0.053	0.379***	0.295***
Geography ($N = 1087$)	0.126***	0.081**	0.151***	0.065	0.399***	0.284***
Mathematics ($N = 1081$)	0.152***	0.067*	0.123**	0.068	0.387***	0.232***
Science ($N = 1091$)	0.163***	0.102**	0.119**	0.074*	0.392***	0.271***
Technology ($N = 1085$)	0.154***	0.075*	0.106**	0.077*	0.375***	0.288***
Music ($N = 1087$)	0.142***	0.120***	0.124**	0.068	0.357***	0.238***
Art ($N = 1075$)	0.142***	0.089**	0.124**	0.056	0.388***	0.330***
Physical Education ($N = 1045$)	0.147***	0.079*	0.101**	0.054	0.334***	0.222***
English ($N = 1084$)	0.167***	0.108***	0.033	0.017	0.332***	0.285***
French ($N = 1010$)	0.142***	0.135***	0.085*	0.044	0.377***	0.283***

* FDR corrected $p < .05$ within each table.
** FDR corrected $p < .01$ within each table.
*** FDR corrected $p < .001$ within each table.

Table 2

Mixed Model for the effects of HEXACO personality traits, Sex and Grade on SP) with Class as clustering variable (Study 1 and Study 2).

	(a) Study 1[a]		(b) Study 2[b]	
	Step 1	Step 2	Step 1	Step 2
Intercept	−0.037	−0.008	0.082	0.084
H	0.079	0.080	0.074*	0.067
E	0.031	0.033	0.061*	0.043
X	−0.013	−0.013	0.027	0.034
A	−0.171***	−0.173***	−0.149***	−0.118**
C	0.281***	0.281***	0.341***	0.333***
O	0.211***	0.213***	0.114***	0.110***
Sex1	–	−0.008	–	0.080*
Grade1	–	−0.062	–	−0.061
Grade2	–	−0.092	–	−0.061

[a] $N = 684$.
[b] $N = 972$.
* FDR corrected $p < .05$ within each subtable (column).
** FDR corrected $p < .01$ within each subtable (column).
*** FDR corrected $p < .001$ within each subtable (column).

3. Study 2

3.1. Method

3.1.1. Participants and procedures

The sample was composed of 1093 middle school students (52.2 % Females, Mean age = 12.02, SD = 0.88, age range = 10–14), recruited from nine schools in Campania (parents' background information in Table A of the SM).

3.1.2. Procedures

The procedures were basically the same as those used in Study 1; therefore, we focus only on differences. Administration of HEXACO-MSI-E personality inventory lasted two spring months (April–May) in 2021 whereas the marks of the end of the academic year 2020–21 were obtained from the schools after the final ballot. During the early months of 2021, schools were still conducting distance learning with teachers present in the classrooms and students connected from home.

3.1.3. Measures

HEXACO-MSI-E. After the background information (age and grade were correlated: $N = 1093$, $r = 0.90$, $p < .001$), we administered a version of the HEXACO-MSI-E consisting of 219 items from which we selected the best 192 items representative of the HEXACO traits and facets and balance for reversed items within each facet (see Gnisci et al., 2023). Few traits were correlated (average $r = 0.27$, SD = 0.14), ranging from |0.09| (X vs H and E vs O) to |0.55| (H vs A). Cronbach's α was 0.90, 0.88, 0.93, 0.92, 0.93, and 0.89 for H, E, X, A, C and O, respectively. Instead, for the facets, it ranged from 0.62 (for Unconventionality) to 0.88 (for Organization).

School Marks. We used semester-end marks at the end of the year. Subject matters were the same as Study 1.

The protocol included other measures that we did not use in this contribution.

3.1.4. Data analysis

Data analysis was the same as in Study 1.

3.2. Results

3.2.1. What is the relation between HEXACO personality traits and marks of adolescents at the end of the second semester?

Before testing this research question, we inspected the intercorrelation matrices between marks (focusing more on the mixed model one), which shows high and positive correlations between each subject matter (Table B in SM), executed a PCA on them, and, finally, checked the reliability of the resulting factor/s. The mono-factorial solution

Table 3

Mixed Models the HEXACO traits as predictors and with each mark as target with Class as clustering variable (Study 1 and Study 2).

(a) Study 1			HEXACO-MSI					
Subject matters	R_c^2	R_m^2	H	E	X	A	C	O
Italian ($N = 682$)	0.47	0.14				−0.37***	0.39***	0.37***
History ($N = 676$)	0.28	0.08	0.22*			−0.27***	0.27***	0.30***
Geography ($N = 683$)	0.38	0.12	0.23**			−0.25***	0.40***	0.31***
Mathematics ($N = 683$)	0.34	0.14				−0.36***	0.51***	0.33***
Science ($N = 683$)	0.44	0.12				−0.27***	0.39***	0.35***
Technology ($N = 682$)	0.44	0.11				−0.23***	0.38***	0.32***
Music ($N = 682$)	0.34	0.11				−0.26***	0.28***	0.30***
Art ($N = 663$)	0.44	0.10				−0.18**	0.26***	0.37***
Physical Education ($N = 683$)	0.43	0.02						
English ($N = 682$)	0.28	0.14				−0.37***	0.43***	0.41***
French ($N = 563$)	0.39	0.14		0.23**		−0.25**	0.45***	0.28***
(b) Study 2								
Italian ($N = 1088$)	0.38	0.15	0.11*	0.08*		−0.19***	0.38***	0.17***
History ($N = 1089$)	0.33	0.14				−0.16***	0.38***	0.18***
Geography ($N = 1091$	0.35	0.14				−0.15***	0.40***	0.15***
Mathematics ($N = 1081$)	0.29	0.13				−0.16***	0.44***	
Science ($N = 1091$)	0.33	0.14				−0.16***	0.41***	0.13**
Technology ($N = 1085$)	0.32	0.13				−0.13**	0.37***	0.16***
Music ($N = 1091$)	0.38	0.11		0.10**		−0.17***	0.40***	0.11*
Art ($N = 1079$)	0.41	0.13				−0.16***	0.33***	0.20***
Physical Education ($N = 1068$)	0.48	0.07				−0.11**	0.28***	0.09*
English ($N = 1084$)	0.28	0.14	0.15***			−0.22***	0.33***	0.21***
French ($N = 1010$)	0.37	0.14		0.11**		−0.21***	0.40***	0.17***

* FDR corrected $p < .05$ within each table.

** FDR corrected $p < .01$ within each table.

*** FDR corrected $p < .001$ within each table.

Table 4

Correlations estimated with a mixed model between the 24 facets and SP with Class as clustering variable (Study 1 and Study 2).

	(a) Study 1[a]	(b) Study 2[c]
	SP	SP
Honesty-Humility		
Sincerity	0.214***	0.208***
Fairness	0.162**	0.183***
Greed Avoidance	0.107**	0.060
Modesty	0.128**	0.074*
Emotionality		
Fearfulness	0.090	0.119***
Dependence	0.015	−0.001
Anxiety	0.106*	0.096**
Sentimentality	0.083	0.094*
eXtraversion		
Social Self-Esteem	0.057	0.113**
Liveliness[d]	0.062	0.119**
Sociability	0.063	0.090*
Social Boldness	0.141***	0.091*
Agreeableness		
Patience	0.007	0.065
Forgivingness[b]	0.026	0.065
Gentleness	0.065	0.090*
Flexibility	0.039	−0.013
Conscientiousness		
Perfectionism	0.373***	0.443***
Diligence	0.513***	0.564***
Organization	0.152***	0.138***
Prudence	0.282***	0.270***
Openness to Experience		
Aesthetic Appreciation	0.226***	0.264***
Inquisitiveness[e]	0.345***	0.288***
Unconventionality[d]	0.239***	0.207***
Creativity	0.267***	0.192***

Study 1: [a]$N = 684$ if not otherwise indicated; [b]$N = 682$.

Study 2: [c]$N = 1091$ if not otherwise indicated; [d]$N = 1089$; [e]$N = 1087$.

* FDR corrected $p < .05$ within each table (column).

** FDR corrected $p < .01$ within each table (column).

*** FDR corrected $p < .001$ within each table (column).

explained 75.02 % of the total variance with the first component having an eigenvalue of 8.25 (the only one higher than 1). All loadings were higher than 0.76. The highest loading was found for Italian (0.91) and the lowest for Physical Education (0.76). Cronbach's α was 0.97. Once established the solution as mono-factorial, we proceeded to use the factor score, that is, SP, as the dependent variable.

Table 1 (Study 2) reports the Multilevel correlations between HEXACO personality traits and each mark, including SP (Table C of the SM reports Pearson correlations but note that they are similar). All the significant correlations were positive; therefore, we do not repeat this information in the following description of the results. The traits C, O, H and E correlated to all marks (respectively, with SP, $r = 0.42$, $r = 0.31$, $r = 0.16$ and $r = 0.11$). X correlated with all the marks apart from English (with SP, $r = 0.12$). A correlated significantly only with two subject matters (Science and Technology) and the correlation with SP was low and not significant ($r = 0.06$).

After analyzing correlations between traits and marks, twelve Mixed Models with the HEXACO traits as predictors and the eleven marks and SP as targets were executed. First, we present results on SP, when only traits were used as predictors (Step 1) and then when also sex and grade were inserted in the regression as covariates (Step 2).

When HEXACO personality traits predicted SP (Table 2, Study 2), the variance explained by the model was 38 % (R_c^2) and the one by the fixed effects 16 % (R_m^2). The significant predictive traits of SP were, in order of their strength, C, A, O, H, and E with A negatively related to SP (Step 1). When Sex and Grade were inserted as covariates (Step 2), the effects of C, A and O remained significant with also Sex as significant (0.08).[1]

Table 3 (Study 2) shows the results of the Mixed Model regressions of the six HEXACO personality traits on each mark of each specific subject matter. Explained variability for each model ranged from 28 % to 48 % (R_c^2) while the variance explained by the fixed effects ranged from 7 % to 14 % (R_m^2) for marks. Three traits predicted all the marks in each subject

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[1] As for the effect of Sex, females (M = 0.15, SD = 1.01) scored higher than males (M = -0.17, SD = 0.96) in SP.

matter, O and C positively and A negatively (apart from O not predicting Mathematics). Few more significant predictions connected significantly other traits to marks: H predicted, in general with low values, two subject matters (Italian and English) while E three (Italian, Music and French). Finally, X never predicted marks.

SM presents results on whether sex (Table D) and grade (Table E) moderated the relationship between HEXACO personality traits and SP in Study 2 (cross-validation). Although one interaction arose for Grade (Grade1*X), whose analysis is reported in Box 3 of the SM, in general, the results can be generalized to males and females, and to the three different grades, at least for H, E, A, C and O.

3.2.2. Which facets did correlate to the general school performance?

We correlated the 24 facets of the dimensions of the HEXACO-MSI-E with SP with Mixed Models (Table 4, Study 2) (in Table F of SM, simple Pearson correlations of traits with marks and SP). We also noted that the Multilevel correlations in Study 1 and 2 were strongly correlated ($r = 0.95$, $p < .001$, $N = 24$), showing that the studies provide very similar results.

In Study 2, all the facets of C, O and X positively and significantly correlated with SP. Within C, the most correlated with SP were the facets of Diligence (0.56) and Perfectionism (0.44), the least Organization (0.14) and in an intermediate position Prudence (0.27). Within O, all the correlations ranged between 0.19 (for Creativity) and 0.29 (Inquisitiveness). Within X, all the correlations ranged between 0.09 (Sociability and Social Boldness) and 0.12 (Liveliness). Three facets of H correlated with SP (the higher was Sincerity followed by Fairness and Modesty). Three facets of E correlated with SP (the higher was Fearfulness, then Anxiety and Sentimentality). The last significant correlation was between Gentleness of A and SP (0.09).

4. Discussion

In this section, we will recap the main results of the two studies with respect to each research question, emphasizing the converging ones, and at the same time discuss them and draw conclusions and implications.

With the first research question, we wanted to ascertain if the personality traits of adolescents had an effect on marks, if this effect remained when sex and grade were considered, and if it could be generalized to males and females and to adolescents of the three different grades.

As far as the correlations of HEXACO traits with SP are concerned, for all the traits, the intensity was very close in the two studies with C stronger than O and H, followed by E and X that correlated with SP with almost the same intensity in the two studies; finally, the only trait not significantly correlated with SP was A. Considering the numerosity of the significant correlations with single marks, the order of importance of the traits was the same in the two studies (C, O, H, E, X and A) with the first three dimensions correlating with the marks in all the subject matters (11 out of 11), E (eight times in Study 1 and eleven in Study 2) with more significant correlations than X (four times in Study 1 and ten in Study 2), and, finally, A that correlated significantly only with one and two marks in Study 1 and 2, respectively.

When we move from the correlations to the Multilevel regressions looking for which trait predicts which mark, in both studies, similar results happened. C and O confirmed their role of stronger predictors, whereas the effect of H, E, and X was considerably resized. This happened because C and O, being the stronger predictors and being correlated with the other three traits, reduced the unique predictive contributions of the other traits. In both Study 1 and 2, C and O confirmed their influence on SP even after covariating sex and grade. Only in Study 2, however, there were two more significant predictions, although low in strength, when only HEXACO traits were entered in the regression, that disappeared when sex and grade were inserted. In both studies, the three significant effects of C, O, and A on the SP remain unchanged when sex and grade were inserted into regression. A deserves

a separate discussion. Indeed, surprisingly, while A correlated very little with marks, in the regressions it predicted all the marks in all the subject matters but negatively. This inversion of the A effect occurred in both studies and depended on partialing out the effect of the other factors. Therefore, the negative effect of A emerges only when other traits were simultaneously accounted for. Finally, the analysis of moderation for sex and grade showed that the effects of personality traits of adolescents that we have observed on SP can be generalized to males and females and across 6th, 7th and 8th grade.

The results relative to the second research question provide information on which facets contributed more to school performance within and outside each dimension, further specifying the results of the first research questions. Together with information from the literature, it deepens and specifies the discussion on dimensions. The premise is that the facet-based analysis provided very similar results in the two studies, which guarantees the solidity and the generalization of the results.

The stronger effect on academic performance in our studies is to be unambiguously attributed to C. All the basic aspects of its dimensions contributed to this outcome. The strongest effects were for Diligence and Perfectionism. Therefore, the tendency to work hard and have self-discipline, to commit to tasks adequate for the age of adolescents (Diligence) and to be detailed and precise during the execution of the task, to check errors when finished and to control and monitor their outcomes (Perfectionism) seem all basic aspects for achieving good outcomes in school. We should add that these two are also by far the strongest correlates out of all the 24 facets. However, also Prudence and, to a lesser extent, Organization contributes. Indeed, Prudence in the HEXACO model is strongly related to impulse inhibition, careful consideration of the consequences, often with planning on the future and doing and following a project. Therefore, it should not surprise that all of this brings in better school performance, particularly linked to the planning and projecting activities, which are basic features when adolescents organize their study. At this age, also keeping organized and ordered the proximal environment and physical surroundings as well as the things within those settings, is very important to reach a good school performance. It is fair to note that the two most connected facets with academic performance are also the ones that use more the school context in their meaning (e.g., homework and studying). Mbuthia et al. (2022) found that Organization and Diligence facets alone were related to academic performance. However, apart from some differences regarding the role of facets, most studies emphasize the robust relationship between Conscientiousness and academic performance (e.g., Mottola et al., 2020; Poropat, 2009; Sergi et al., 2020). Conscientiousness, with its features of organizing time, information, and physical environment, may help adolescents to make more effective plans regarding studies, to work hard to achieve learning goals, and to better self-regulate.

The second most influential trait was O in which all the facets contributed to SP in both Study 1 and 2. Indeed, in both studies, the strongest predicting facet was Inquisitiveness, which was also the third predicting among all facets. And, indeed, its items semantically refer to curiosity, interest and information seeking toward natural and social sciences as well as reading and liking and concern toward other countries. The remaining three facets present similar correlation coefficients with SP. Therefore, Aesthetic appreciation (toward art, literature, poetry, painting), Creativity (novel and original ideas and thinking, fantasy, imagination, desire to create a work of art) and Unconventionality (opinions, behaviors, ideas, being divergent from normality) have a similar weight on school performance. As it is probably normal to expect, school performance is driven more by interest and curiosity toward science than toward creative and unconventional thinking. In the literature, only the Inquisitiveness and Creativity facets had significant associations with academic performance (Mbuthia et al., 2022), although other studies found that Openness was weakly related to high school or to university academic performance (Noftle & Robins, 2007). We think that different results on the effect of O on scholastic outcome can also depend on its interaction with the type of school environment

and/or by particular teaching staff. When opened to novelty and creativity, the school may encourage the open-to-experience students to perform better; when more based on traditions, it could harm their performance. Based on the results of our study, however, O and its facets might sustain achievement in different ways. To start with, adolescents high in O, in force of their curiosity and inquisitiveness, have more knowledge of the subject matter to be studied in school. In addition, adolescents high in O can be more motivated and interested in knowledge and discovery, which help to them adopt a deep approach to learning and elaborative learning (Komarraju et al., 2009). Finally, the finding that the correlation of Openness to Experience with academic performance is slightly less than the one of Conscientiousness differs from the meta-analytic result of Poropat (2009), who found that academic achievement correlated twice as strongly with Conscientiousness as with Openness.

Regarding H, X and E, even if their effects were considerably resized in regression, as discussed above, the pattern of correlations suggests that the three can have a role in school performance. Indeed, the third trait associated with academic performance is H. All its facets are significantly associated with SP in both studies (except for Greed Avoidance in Study 2), but the higher correlation was found with Sincerity followed by Fairness. Therefore, school performance is driven also by tendency to have genuine interpersonal relationships avoiding manipulating others with flattery, fictions, shams and lies (Sincerity) as well as to avoid stealing, taking advantage of others or cheating and practicing dishonest behavior (Fairness). A smaller contribution to school performance was provided by Modesty, that is, the tendency to view themselves as ordinary people who do not need special and privileged treatment, such as getting good marks without studying or making an effort. As a result, modest adolescents may work harder to perform well. High level of Honesty-Humility can promote ethical and responsible study behaviors: indeed, it is inversely related to counterproductive academic behaviors (de Vries et al., 2011). Therefore, adolescents high on this trait, and especially on its Sincerity and Fairness facets, are less likely to break rules and cheat to get better academic performance, but at the same time are more likely to have a responsible attitude toward the study which would lead them to put more effort into achieving good results. Only in the first study, a more modest contribution to school performance was provided by Greed Avoidance, as expressed by the tendency to be uninterested in possessing money, luxury goods, visible signs of power and high social status and in becoming famous or a celebrity. Adolescents high on Greed Avoidance may be spending less time taking care of their social reputation, for example among friends at school, and more time studying (de Vries et al., 2011). Our results, at facet-level, are discordant with de Vries et al.'s (2011) study. Indeed, that study showed that among the facets of Honesty–Humility, Greed Avoidance and Modesty were the most important predictors of academic performance.

We have seen that X, in line with previous studies (e.g., Mervielde et al., 1995; Mottola et al., 2020; Sergi et al., 2020), showed some signs of being correlated with marks and general school performance, particularly in Study 2. This is also reflected in facets that show discordant results from Study 1 to 2. In fact, in both studies, only Social Boldness was associated with SP, but in Study 1 none of the remaining facets predicted SP, whereas in Study 2 all the facets predicted it with almost low intensity. This could be interpreted considering that being able to speak in public, express themselves without embarrassment, saying what one thinks, either in front of others, new people, in public or in a group enhance the possibility to express what they know and therefore better perform at school. However, with conflicting results, our study suggests that also Liveliness, Social Self-Esteem and Sociability may have a small role in determining school performance. A possible explanation is that adolescents who score high on these facets perform better because of higher energy levels, along with a positive attitude leading to a desire to learn and understand (De Raad & Schouwenburg, 1996). However, these facets may also facilitate adolescents'

relationships with peers and teachers, and so support their overall learning experiences.

Finally, E seems to have a role in determining school performance even if a bit marginal, coherently with previous studies (Mottola et al., 2020; Sergi et al., 2020). Also in this case, the evidence is mixed. Only Anxiety seems to drive scholastic performance in both studies although with low intensity, probably because being concerned with something allows students to focus on that task, when anxiety is not pathological. Only in the second study, Fearfulness and Sentimentality were associated with SP. Adolescents who tend to feel more fear and are more empathetic might be afraid of getting a bad mark, that this might eventually cause displeasure in their parents or significant others, and, as a consequence, they are spurred to study harder to get higher marks and avoid these negative emotions/consequences.

Discussion of the effect of A is somewhat more complex because it is not correlated with general school performance and also to many specific marks in specific subject matters but, in the regression models, it predicts negatively school performance. Some studies have found that Big Five Agreeableness was indeed negatively associated with school performance (Busato et al., 2000; McAbee et al., 2014; Rothstein et al., 1994). We cannot exclude that the negative effects that we found in the Multilevel regressions are statistical artifacts. An inspection of the correlations between traits suggests that it is mainly due to the correlation between A and C (0.39 in both studies) and their multicollinearity with the marks. This is further confirmed by Mixed Models in which the small positive predictive value of A on SP (0.04 and 0.06 for the first and the second study, respectively) became already negative and significant after adding C as a predictor (−0.17 and − 0.16, for the first and the second study, respectively). However, a substantive interpretation of the effect suggests that the portion of A that is unrelated to being conscientious is detrimental to scholastic achievement. For example, this might happen because being agreeable (e.g., gentle, cooperative) without being conscientious, determined, and organized, implies focusing one's own time and energies on interpersonal relations at the expense of focusing on what needs to be done, such as studying in an organized manner, to succeed scholastically.

Considering the overall pattern of results, we can elaborate that if improving academic performance is the aim of the adolescents and of their significant others, possible interventions should be focused, in the first instance, on the HEXACO traits or facets of C and O and, secondarily, on H, E and X. For example, recent research demonstrated that, in adults, potential promoters of change as the intentional and deliberate efforts of the individuals, personal psychotherapy, psychological support in school settings by a professional, or support and constructive help by parents and other family members may push or promote real change of personality traits and, as a consequence, improve life satisfaction (Baranski et al., 2021; Olaru et al., 2023). Indeed, personality traits can be targets for policy changes and interventions (Bleidorn et al., 2019). This kind of intervention can be applied also to adolescents. For example, adolescents who feel low on conscientiousness and struggle to organize their time and surroundings, avoid difficult tasks or challenging goals, make mistakes in their homework, and are too impulsive in school settings, may strongly benefit from a voluntary intervention on Conscientiousness or on behaviors related to one of its specific facets as organization, diligence, perfectionism, and prudence (Lee & Ashton, 2004). Improving the ability of adolescents to carefully plan their activities, to organize commitments within and outside school on a weekly or daily basis, to supervise the alleged mistakes in homework, or to carry out tasks diligently may result in improved school performance. Some interventions can be done with the help of a coach during some (e.g., 10) weeks program to diagnose undesired personality features and elaborate a strategy targeted on those features (Allan et al., 2018; Martin et al., 2014). In some interventions, the coaching activity was executed via text messaging services (Olaru et al., 2022; Stieger et al., 2020). These kinds of interventions may evolve in an interesting direction because they could use smartphone-based intervention and dedicated apps to

interact with the adolescent (Filler et al., 2015; Kowatsch et al., 2017; Stieger et al., 2020). This seems very important given that mobile phones are ecological instruments for middle school adolescents and may motivate their intentions and behavior in personality change and school improvement.

Regardless of the hypotheses, a further result of this contribution is that in both studies, adolescents who performed well in determined subject matters, performed well also in all the other subject matters. Indeed, both factorial analyses on the two samples showed strong evidence of a unifying, mono-factorial, and reliable factor, latent to all the subject matters. Thus, the classical distinction between humanistic and scientific subject matters (or similar distinctions) seems no longer sustainable. Moreover, we often found evidence that some traits were associated with or predicted the marks in all or almost all subject matters, which supports the hypothesis of a global performance across different subject matters driven by the same cognitive abilities and similar personality traits.

5. Conclusions

We think that this study has merits and innovative aspects. We have tested relatively large samples of adolescents with the emergent HEXACO model that goes beyond the classic FFM, we have used a Multilevel method approach, that is, a Mixed Model analysis that allowed us to control the variance due to the specific class, and we ran two independent studies with replicated results, hence allowing to focus on robust and solid findings. Utilizing the HEXACO model allows for a more comprehensive and nuanced view of adolescents' personalities compared to more traditional models. Literature suggests that at the age of 10, that is, the minimum age of our sample, children begin to describe themselves in terms of personality traits rather than of a generic, moral features as good or bad (Ashton, 2023) and that, notwithstanding some differences and tendencies, personality structure during childhood is similar to the one observed during adulthood. This study can add significant knowledge to the field of adolescent psychology, providing new data on how personality affects learning dynamics during middle school year, that appear to be a bridge just between childhood and adolescence.

This study has also some limitations. First, the samples come from the same Italian region, which, notwithstanding the large sizes, naturally limits the generalizability of the specific results. Given the low number of studies on adolescents relevant to school settings from an HEXACO perspective, future studies should consolidate and articulate the results of the present study. Second, in the first study, our original intention was to collect data on adolescents during the second semester, as we did, and obtain school marks at the end of the school year (i.e., the second semester). However, this was not possible because, as described in the method, the first, dramatic COVID-19 lockdown occurred in Italy, and this rendered meaningless the final marks. Therefore, we decided to consider the marks of the first semester, as we deemed to be the only viable alternative. The second study went beyond this limitation and allowed us to collect marks at the end of the year, with most results involving marks that were replicated in the second study. We hope that future studies on adolescents with the HEXACO model in school settings will increase relevant scientific knowledge.

CRediT authorship contribution statement

Ida Sergi: Writing – original draft, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization. **Lucia Ariemma:** Supervision, Investigation, Funding acquisition. **Marcello Gallucci:** Supervision, Formal analysis. **Augusto Gnisci:** Writing – original draft, Resources, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Roberto Marcone:** Supervision, Investigation. **Marco Perugini:** Supervision, Methodology, Investigation, Formal analysis. **Vincenzo Paolo Senese:** Validation, Resources, Project administration, Methodology, Funding acquisition, Data curation, Conceptualization. **Francesca Mottola:** Writing – original draft, Validation, Formal analysis, Data curation.

Declaration of competing interest

None.

Data availability

The authors have shared the link to the datafiles.
Personality and School Marks (Original data) (https://doi.org/10.17605/OSF.IO/NATQC)

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.actpsy.2024.104319.

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