ROBUST AND MID-LEVEL PERSONALITY TRAITS AS PREDICTORS OF ADOLESCENTS' ACADEMIC ACHIEVEMENT IN SECONDARY SCHOOL

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Summary

This study considers the predictive value of adolescents' (M_{age} = 16.8 years) robust and mid-level personality traits in explaining academic achievement (GPA). Personality data was obtained through self, maternal, and peer report using the Inventory of Child/Adolescent Individual Differences. The four robust personality traits according to self, maternal and peer report predicted 11%, 27% and 18% of the variance in secondary students' GPA, respectively, with conscientiousness (across the informants) and low extraversion (maternal and peer ratings) as significant predictors. When the constituent 15 mid-level traits were accounted for, the prediction increased to 30% (self-), 34% (maternal-) and 27% (peer ratings). Subjectively perceived students' intelligence consistently contributed to their GPA, along with self- and mother-rated low antagonism, while other significant predictors were observer specific. The reduced models considering the significant robust and mid-level traits only decreased the predictive power of self-reported robust traits and peer-rated mid-level traits but they slightly contributed to the accuracy of all other models. The study provides support for the predictive utility of mid-level personality traits over the robust traits in the prediction of GPA for self- and maternal personality ratings.

Key words: academic achievement, adolescents, multiple informants, personality traits

INTRODUCTION

Over the past two decades, a relative consensus was established that the Five-Factor Model (FFM) of personality represents the dominant conceptualization of

personality structure in adults. The five broad or robust personality factors (traits), residing at the highest level of personality trait hierarchy comprise extraversion, agreeableness, conscientiousness, neuroticism, and openness (McCrae and Costa, 1997). Extraversion includes narrow traits such as activity, outgoingness, sociability, assertiveness, and positive emotionality. Agreeableness is characterized by kindness, cooperation, amiability, and pro-sociality. Conscientiousness represents characteristics such as being dutiful, self-disciplined, organized, systematic, efficient, precise, persistent, steady, responsible, and achievement oriented. Neuroticism encompasses anxiety, irritability, moodiness, and frequent experiences of insecurity. Openness (or openness/intellect) refers to curiosity, tendency to explore new things, imagination, and often subjectively perceived intelligence.

The self-reported personality trait structure matures in early adolescence and becomes fully congruent with the adult structure by mid-adolescence (Allik, Laidra, Realo and Pullman, 2004). A similar FFM structure emerges in parental and teacher ratings of school-age children and adolescents (Halverson, Havill, Deal, Baker, Victor, Pavlopoulos et al., 2003; Mervielde, Buyst and De Fruyt, 1995; Mervielde and De Fruyt, 2002). However, the precise number of factors in pre-adult personality trait organization, the grouping of questionnaire items and patterns of factor loadings may depend on the age of the targets and the informants (e.g. self-, peer-, parent-, teacher report), on the cultural context, and the assessment tools employed (e.g. Smrtnik Vitulić and Zupančič, 2009; Zupančič and Kavčič, 2007, 2009). Thus, when relying on trait ratings by multiple informants as in case of the present study, the factorial invariance has to be assured.

Relevant information on adolescents' personality can be obtained by self reports or reports by others who know the targets well. Nevertheless, any ratings are always subjectively biased and the level of agreement between informants is usually significant but low to moderate (e.g. Halverson et al., 2003; Smrtnik Vitulić and Zupančič, 2009; Zupančič and Kavčič, 2007). Different groups of informants may perceive and describe target adolescents' personality differently because: (a) the adolescents' behaviour varies across different contexts; (b) different informants do not know the targets equally well and they are involved in different relationships with the ratees; (c) self-reports in contrast to ratings by others may be more accurate because of the targets' direct access to their inner states but the self-reports are more susceptible to the self-enhancement bias (e.g. Smrtnik Vitulić and Zupančič, 2009). Therefore, personality assessments of the same individuals by different informant groups may provide more accurate and valid information on the targets than data obtained by a single informant group. For example, in predicting academic achievement, peer ratings of adolescent personality show a significant incremental validity over and beyond self-ratings (Bratko, Chamorro-Premuzic and Saks, 2006; Smrtnik Vitulić and Zupančič, 2010), and teachers' ratings of child/adolescent personality appear to be more powerful predictors of students' academic attainment than maternal personality ratings (Barbaranelli, Caprara, Rabasca and Pastorelli, 2003; Zupančič and Kavčič, 2007).

Identification and understanding of major predictors of individual differences in academic achievement has been a concern of educationalists for decades because knowledge of the relevant factors influencing academic performance has important implications for learning and education (e.g. Chamorro-Premuzic and Furnham, 2003; O'Connor and Paunonen, 2007). Personality traits are suggested to play an important role in the development of knowledge as they may: (a) direct an individual's choice and level of persistence to engage in intellectually stimulating activities and academic settings (Ackerman, 1996), (b) affect certain habits that have an influence on academic success (Rothstein, Paunonen, Rush and King, 1994), and (c) reflect an individual's typical performance, i.e. what he/she will do rather than what he/she can do as reflected in ability test scores (Furnham and Chamorro-Premuzic, 2004). Recent studies of the relations between personality traits and academic achievement generally operate under the framework of the FFM of personality structure, and they usually investigate how well the robust personality traits predict students' scholastic attainments (O'Connor and Paunonen, 2007).

Some of the robust FFM traits have been found to be better predictors of adolescents' academic achievements than others. Conscientiousness has been most consistently demonstrated a significant predictor (e.g. Bratko et al., 2006; Laidra, Pullmann and Allik, 2007; Zupančič and Kavčič, 2007). Extant studies have produced mixed results about the predictive power of the openness/intellect factor on academic success. Many authors have identified a positive association between openness and academic performance (Bratko et al., 2006; Laidra et al., 2007; Puklek Levpušček and Zupančič, 2009a), but others have failed to find a significant association between the two variables (e.g. Busato, Prins, Elshout and Hamaker, 2000; Goff and Ackerman, 1992). Extraversion seems to predict higher grades in school-age children but lower grades in adolescents (Bratko et al., 2006; Furnham, Chamorro-Premuzic and McDougall 2003; Laidra et al., 2007; Puklek Levpušček and Zupančič, 2009a). Neuroticism shows low negative correlations (e.g. Laidra et al., 2007) or no significant associations with school grades (e.g. Puklek Levpušček and Zupančič, 2009a), while agreeableness predicts academic success in school-age children but not in adolescents (Laidra et al., 2007; O'Connor and Paunonen 2007; Zupančič and Kavčič, 2007).

Only a few studies have examined the relationship between academic achievement and personality at the specific primary trait level (narrow personality traits at lower levels of personality hierarchy or facets) (Chamorro-Premuzic and Furnham, 2003; De Fruyt and Mervielde, 1996; Gray and Watson, 2002). The results showed significant correlations of a small number of primary traits with academic achievement, particularly of *dutifulness* and *achievement striving* (facets of conscientiousness), low *anxiety*, and low *impulsiveness* (facets of neuroticism); also, *gregariousness* and *activity* (facets of extraversion) have been reported to be negatively associated with academic performance in the study by Chamorro-Premuzic and Furnham (2003) but more active students were performing better academically

in De Fruyt and Mervielde's study (1996). However, an investigation of the predictive value of primary traits is important because it provides information about specific traits and processes that may explain the associations of robust traits with achievement. Primary traits may also improve the prediction of academic performance relative to the prediction based on robust personality traits as students with similar robust trait scores may have different primary trait scores. An examination of primary traits would thus reduce speculative interpretations about the predictive nature of robust personality traits, that is, it would show which aspects of the robust traits are actually related to academic achievement (e.g. Chamorro-Premuzic and Furnham, 2003; O'Connor and Paunonen, 2007).

In the present study we will focus on the predictability of secondary school students' academic achievement by both the robust personality traits and their specific constituent traits (labelled mid-level traits by the authors of the inventory being used in our research; Halverson et al., 2003). The academic achievement was defined in terms of a grade point average (GPA). Because teaching and grading is mainly academically oriented in secondary schools, we assume that the teachers' final grades would reflect the level of knowledge attained by students. Also, most of the related studies investigating factors of academic attainment (e.g. Bratko et al., 2006; Laidra et al., 2007; Pullmann and Allik, 2008) have employed the GPA as a single indicator of scholastic achievement. Although several studies show that parental education and adolescents' gender were significantly associated with students' academic success (e.g. Considine and Zappalà 2002; Peček, Čuk and Lesar, 2006; Puklek Levpušček and Zupančič, 2009b; Razdevšek-Pučko, Peček and Čuk, 2003), our recent research (Smrtnik Vitulić and Zupančič, 2010) suggests that adolescent's gender predicts very small portions of variance in GPA at the end of compulsory school (1%) and in secondary school (3%); maternal education also appears to be a considerably stronger predictor of the GPA in the last grade of compulsory school than in secondary school (maternal education explaining 4% of unique variance in the GPA in secondary school). Therefore, we will not account for these two variables in our analyses.

Goals and novelty of the research

Our study extends previous research in several ways: (a) a recently developed age and culture neutral instrument to assess child/adolescent personality traits was employed, (b) along with the relation between the students' GPA and their robust traits, the relation between achievement and mid-level traits will be explored in order to find out which of the robust trait constituents contribute to the GPA, and whether the prediction of the GPA by personality can be more accurate at the robust or mid-trait level, (c) the predictive relations with the GPA will be based on multiple informant personality ratings (self-, maternal and peer reports) to investigate the

extent to which adolescents' personality traits rated by each of the three informant groups explain variation in the GPA.

METHOD

Participants and procedure

Participants were 168 target adolescents (62% girls), aged from 16.0 to 17.6 years (M = 16.8 years, SD = 5 months), attending one of 39 randomly selected Slovene secondary schools in different regions of the country. Most adolescents were in the second grade of a general high school. They filled in a self-report version of a personality inventory. Their mothers (N = 142) and same-sex classmates (N = 336) also provided reports on the target adolescents' personality using the same inventory (other-report version). Each adolescent was rated by two randomly selected same-sex classmates and the peer ratings were aggregated to increase the reliability of trait scores (Smrtnik Vitulić and Zupančič, 2009). Educational level of the adolescents' mothers ranged from eight-year elementary school to Ph.D. with a mean of 12.74 completed years of schooling. Adolescents and their classmates responded to the personality inventory in school, while the mothers administered the inventory at their home and returned it to school in a sealed envelope. The adolescents' final school grades were collected from the school records at the end of the second school year. All of the participants were fully informed on the purposes and methods of the study and their participation was voluntary.

Measures

Academic achievement: Grade-point average (GPA) was calculated for each target individual. Students in Slovenia are graded in each course on a five-mark system from 1 (not sufficient) to 5 (excellent). Because all of the students did not take exactly the same courses, the GPA was represented by a mean of six to eight of the following final grades: Slovene, English, mathematics, physics, chemistry, biology, history, and geography. For the overall sample 168 final grades were collected in Slovene, English and mathematics, 138 in physics, 151 in chemistry, 143 in biology, 164 in history, and 140 in geography. Thus, the final grades in the first three courses were obtained for all participants, while the grades in the remaining courses were specific for each student (some only took three of these courses, others four, and most of them took all five as they attended a general high school). The GPA was 3.15 (*SD* = .79) with girls attaining a somewhat higher mean GPA than boys (*M* = 3.26 vs. 3.03; *t*(166) = -1,88, *p* < .04).

Personality traits: Participants completed the adapted and normalized Slovene version (Zupančič and Kavčič, 2009) of the Inventory of Child/Adolescent Indi-

vidual Differences (ICID; Halverson et al., 2003). It is a 108 item measure (in other- and self report form) of 15 mid-level personality traits. The items are based on parental free descriptions of children/adolescents across seven countries and are rated on a seven-point Likert-type scale which may be used in several forms. The response format from 1 = *not true for me (him/her)* to 7 = *entirely true* was used in the present study. The 15 ICID mid-level scales form four correlated robust personality measures: extraversion (*Activity Level*, *Considerate*, *Open to Experience*, *Positive Emotion,* and *Sociable* scales), (dis)agreeableness (*Antagonism*, *Negative Affect*, and *Strong Will*), conscientiousness (*Achievement Oriented*, *Compliant*, *Distractible*-reversed, *Intelligent*, and *Organized*), and neuroticism (*Fearful/Insecure*, and *Shy*). The scoring key for the robust personality scales is based on exploratory factor analyses of data on different age groups of Slovene children/adolescents (from three- to 18-year-olds) and over methods of assessment (mother, father, teacher, and adolescent self-ratings). Across the Slovene normative groups, the four factors explain 92% of the variance, they show factorial invariance across ages and informant ratings, are strongly internally coherent, considerably stable over one to three years time period, moderately stable across contexts, and demonstrate a good criterion validity against measures of social competence, problem behaviour, and interpersonal relationships (Zupančič and Kavčič, 2009).

As we relied on the scoring key suggested by the Slovene ICID manual (Zupančič and Kavčič, 2009) which provides an invariant factorial measure across the targets' ages, different observers' ratings and accounting for all of the 15 mid-level scales, openness was not considered an independent factor in the present inquiry. Unfortunately, the invariant five-factor structure (with openness as an independent factor comprising the openness to experience and intelligence facets) is obtained over age and methods of assessment only when the Compliant and Considerate scales are omitted (Knyazev, Zupančič and Slobodskaya, 2008).

Statistical analysis

Pearson correlations of the students' GPA with the four robust personality scale scores and the 15 mid-level scale scores by each of the three groups of informants were calculated. Then, several sets of multiple regression analyses were conducted to test predictive relations of personality ratings with the GPA: (1) in order to test the contribution of each of the *robust personality traits* in the prediction of academic achievement, the GPA was regressed onto the four personality traits for each set of adolescents' personality ratings separately (self-, maternal, and peer); (2) the GPA was regressed only onto those robust traits which appeared significant predictors of the GPA to determine the amount of variance in the GPA explained by these traits alone (three sets of analyses, for each informant group separately); (3) another three sets of multiple regressions were performed to test the predictability of the GPA by

all 15 adolescents' *mid-level trait ratings* (4) the amount of variance in the GPA explained by the significant mid-level trait predictors alone was determined in the final three sets of the regression analysis to provide a balanced comparison with the amount of variance explained by the significant robust traits.

RESULTS

Table 1 shows correlations of the GPA with the robust trait ratings (extraversion, disagreeableness, conscientiousness, and neuroticism) and mid-level trait ratings of adolescents' personality by three informant groups. The size of correlations is modest to moderate. Fisher's *z*-transformed correlations for both robust and mid-level trait ratings were averaged and the mean *r*s are also presented at the bottom lines of the table 1. Conscientiousness and its constituent mid-level traits of achievement

Table 1. Correlations of robust- and mid-level trait ratings of adolescents' with their GPA (self, mother and peer ratings)

	Self ratings N=168	Mother ratings N=142	Peer ratings N=168
Extraversion	-0.07	-0.05	0.01
Activity Level	-0.12	-0.07	-0.10
Considerate	0.06	0.02	0.17*
Open to Experience	-0.03	0.05	0.02
Positive Emotion	-0.01	-0.01	0.06
Sociable	-0.16*	-0.14	-0.07
Disagreeableness	-0.10	-0.24**	-0.11
Antagonism	-0.22**	-0.032**	-0.18*
Negative Affect	0.00	-0.11	-0.07
Strong Will	-0.06	-0.21**	-0.04
Conscientiousness	0.23**	0.45**	0.38**
Achievement Oriented	0.20**	0.45**	0.35**
Compliant	0.17*	0.33**	0.28**
Distractible-reversed	0.11	0.36**	0.19*
Intelligent	0.29**	0.35**	0.42**
Organized	0.16*	0.34**	0.37**
Neuroticism	0.12	0.05	0.13
Fearful/Insecure	0.09	-0.04	0.04
Shy	0.12	0.10	-0.08
Mean *r* (robust traits)	0.12	0.20	0.17
Mean *r* (mid-level traits)	0.13	0.21	0.16

Notes. GPA = grade point average in the second grade of secondary school; Peer ratings = number of students rated by two classmates (aggregated).
*$p < 0.05$; **$p < 0.01$.

orientation, compliance, subjective intelligence and organized behaviour appear significantly correlated with the GPA across the ratings of all informant groups (self, maternal, peers); low distractibility according to maternal and peer ratings of the target adolescents also associates with the GPA. Disagreeableness is significantly and negatively correlated with the GPA, but only for maternal ratings of adolescents' personality, whereas its constituent trait of antagonism seems negatively linked to the GPA across the informant ratings. In addition, maternal ratings of their adolescents' strong will (disagreeableness) shows negative relations with the GPA and peer ratings of the targets' considerate behaviour (extraversion) is positively linked to the GPA.

In order to test the contribution of each of the four robust personality traits in the prediction of GPA, multiple regression analyses were carried out. The upper section of the Table 2 presents standardized β coefficients and t values for four adolescents' robust traits (the full model) across three sets of the analysis (self, maternal and peer ratings) and the lower section of the Table 2 displays results of the reduced model with significant robust traits only entered as predictors. All robust personality traits by self-, maternal, and peer ratings accounted for 11%, 27% and 18% of variance, respectively, in the students' GPA at the end of the second year of their secondary schooling. Conscientiousness was the most consistent significant predictor across

Table 2. Standardized β and t values for all four robust traits of adolescents' personality (self-, mother and peer ratings) and for significant traits only as predictors of the GPA after multiple regression analysis

	Self ratings N=168		Mother ratings N=142		Peer ratings N=168	
	β	t	β	t	β	t
Extraversion	-0.20	-1.83	-0.24*	-2.42*	-0.23**	-2.65*
Disagreeableness	0.00	0.05	-0.09	-1.17	0.11	1.32
Conscientiousness	0.41**	4.27**	0.56**	6.56**	0.54**	6.02**
Neuroticism	0.16	1.62	0.11	1.14	0.10	1.26
F	5.90**		14.22**		10.30**	
R²	0.13		0.29		0.20	
Adj R²	0.11		0.27		0.18	
Extraversion			-0.31**	-3.87**	-0.26**	-3.11**
Conscientiousness	0.23**	3.02**	0.59**	7.34**	0.51**	6.20**
F	9.13**		27.17**		19.26**	
R²	0.05		0.28		0.19	
Adj R²	0.05		0.27		0.18	

Notes. GPA = grade point average in the second grade of secondary school; Peer ratings = number of students rated by two classmates (aggregated); Self ratings $df = 4,164$ (four traits), $df = 1,167$ (one trait); Mother ratings $df = 4,138$ (four traits), $df = 2,140$ (two traits); Peer ratings $df = 4,164$ (four traits), $df = 2,166$ (two traits).
*$p < 0.05$; **$p < 0.01$.

the informant ratings, whereas extraversion was significant with regard to maternal and peer personality ratings only and it appeared negatively related to the GPA. The three sets of multiple regression analysis (for each group of informants separately) were further re-ran with the significant robust personality traits only as predictors of the students' GPA, i.e. conscientiousness (across the informant ratings) and extraversion (maternal and peer ratings). Those adolescents' self-, maternal and peer trait ratings alone accounted for 5%, 27%, and 18% of variance in their GPA. The reduced predictive model concerning maternal and peer ratings of adolescents' personality (conscientiousness and extraversion only) presents a slight improvement over the full model (accounting for all of the robust traits) because the former is more parsimonious and stable (see R^2 vs. Adj. R^2) while explaining an equal amount

Table 3. Standardized *β* and *t* values for the 15 constituent mid-level traits of adolescents' personality (self-, mother and peer ratings) as predictors of the GPA after multiple regression analysis

	Self ratings N=168		Mother ratings N=142		Peer ratings N=168	
	β	t	β	t	β	t
Extraversion						
Activity Level	-0.14	-1.52	-0.04	-0.39	-0.08	-0.79
Considerate	-0.17	-1.23	-0.31*	-2.21*	0.14	-0.72
Open to Experience	-0.23*	-2.12*	-0.10	-0.88	-0.14	-1.27
Positive Emotion	0.24	1.50	0.11	0.66	-0.06	-0.32
Sociable	-0.35*	-2.14*	-0.21	-1.26	-0.28	-1.75
Disagreeableness						
Antagonism	-0.35**	-3.24**	-0.36*	-2.86*	-0.06	-0.52
Negative Affect	0.14	1.34	0.07	0.62	0.03	0.25
Strong Will	-0.06	-0.59	-0.08	-0.71	0.02	0.16
Conscientiousness						
Achieve. oriented	0.22	1.90	0.43**	3.16**	0.23	1.64
Compliant	-0.19	-1.59	-0.21	-1.61	-0.10	-0.72
Distractible-reversed	0.03	0.30	0.01	0.08	0.31**	2.69**
Intelligent	0.69**	6.53**	0.42**	3.81**	0.56**	5.24**
Organized	-0.09	-0.85	0.00	0.02	0.12	0.78
Neuroticism						
Fearful/Insecure	0.24*	2.04*	0.04	0.36	-0.11	-0.97
Shy	-0.08	-0.57	0.04	0.31	-0.02	-0.18
F	5.77**		5.88**		5.04**	
R^2	0.36		0.41		0.33	
Adj R^2	0.30		0.34		0.27	

Notes. GPA = grade point average in the second grade of secondary school; Achieve. Oriented = Achievement Oriented; Peer ratings = number of students rated by two classmates (aggregated); Self ratings *df* = 15,153; Mother ratings *df* = 15,127; Peer ratings *df* = 15,153.
*$p < 0.05$; **$p < 0.01$.

of variance in the GPA. However, the reduced model based on adolescents' self reports (with conscientiousness entered as the only predictor) decreases the prediction of their GPA in comparison to the full model.

Another three sets of multiple regression analysis were carried out to test the predictability of GPA by self-, mother and peer ratings of adolescents' mid-level personality traits which constitute the robust traits of extraversion, disagreeableness, conscientiousness and neuroticism (see Table 3). The 15 mid-level trait ratings by self-, mothers and peers explained 30%, 34% and 27% of the variance in adolescents' GPA, respectively. The strongest and the most consistent predictor was perceived adolescents' intelligence (a conscientiousness marker trait). Low antagonism (a disagreeableness marker trait) by self- and maternal reports was also predictive of the students' GPA and so were self-reported low levels of openness to experience and sociability (extraversion marker traits), and fear/insecurity (a neuroticism marker trait), maternal ratings of their children's low consideration (an extraversion marker trait) and high achievement orientation, and peer ratings of adolescents' low distractibility (both conscientiousness marker traits).

The full mid-level trait model across the three informant groups obviously presents an improvement over the full robust model in terms of the GPA variance ex-

Table 4. Standardized β and t values for the 15 significant mid-level traits (self-, mother and peer ratings) as predictors of the GPA after multiple regression analysis

	Self ratings N=168		Mother ratings N=142		Peer ratings N=168	
	β	t	β	t	β	t
Extraversion						
Considerate			-0.42**	-4.53**		
Open to Experience	-0.21*	-2.16*				
Sociable	-0.27**	-2.89**				
Disagreeableness						
Antagonism	-0.23**	-3.41**	-0.34**	-3.42**		
Conscientiousness						
Achieve. oriented			0.35**	3.89**		
Distractible-reversed					-0.10**	-1.09**
Intelligent	0.64**	7.09**	0.23**	3.03**	0.40**	5.32**
Neuroticism						
Fearful/Insecure	0.25**	3.17**				
F	14.88**		17.42**		17.90**	
R^2	0.31		0.34		0.18	
Adj R^2	0.29		0.32		0.17	

Notes. GPA = grade point average in the second grade of secondary school; Achieve. Oriented = Achievement Oriented; Peer ratings = number of students rated by two classmates (aggregated); Self ratings *df* = 5,163; Mother ratings *df* = 4,138; Peer ratings *df* = 2,166.
*p < 0.05; **p < 0.01.

plained by personality ratings. However, there are potential problems associated with comparing a smaller number of robust trait ratings (see the upper section of the Table 2) to a larger number of mid-level trait predictors (see Table 3). Therefore, we compared the amount of variance in the GPA predicted by ratings of the significant robust traits (see the lower section of the Table 2) with the amount of variance explained by significant mid-level traits (see Table 4). Those mid-level trait ratings alone accounted for 29%, 32% and 17% of the variance in the GPA, indicating an improvement in the prediction of the GPA over the reduced robust trait model for self- and maternal personality ratings but not for peer ratings. On the one hand, the comparison was still not completely fair with regard to self- and maternal ratings as the reduced "robust trait" model accounted for one and two predictors, respectively, relative to the reduced mid-level trait model considering five (self-ratings) and four predictors (maternal ratings). On the other hand, the reduced mid-level trait models across the informant ratings appear relatively stable (while the full mid-level trait models are not) and they help explain the predictive nature of the robust traits.

DISCUSSION

The present study has examined which and to what extent the ratings of adolescents' personality (robust- and mid-level traits) by different informants as measured by the Inventory of Child/Adolescent Individual Differences (Halverson et al., 2003; Zupančič and Kavčič, 2009) predict grade point average (GPA) in the end of the second grade of the secondary school. The findings replicated results of recent studies (e.g. Bratko et al., 2006; Chamorro-Premuzic and Furnham, 2003; Laidra et al., 2007) on the predictive value of conscientiousness and low extraversion in explaining adolescents' academic achievement. In addition to most previous investigations, our results were drawn from multiple informant ratings of adolescents' personality (self-, maternal and peer) and provided information on specific traits which lie behind the links of the robust personality traits with the GPA.

In line with the meta-analysis of other studies (O'Connor and Paunonen, 2007), conscientiousness was, among the four robust traits of our inquiry, the most consistent (across ratings of three informant groups) and the strongest predictor of the GPA, indicating that conscientious students tend to perform better academically than do their less conscientious peers. The link between conscientiousness and academic achievement has often been interpreted in terms of motivation, classroom behaviour, and study habits. Conscientious students may be more motivated to perform well academically than their less conscientious counterparts and in evaluating academic knowledge the teachers often account for the students' academic effort and cooperation in the classroom (Peček, Zuljan, Čuk and Lesar, 2008). Students' persistence, dutifulness, organized behaviour, achievement orientation, and concentration may also have a beneficial role in development of study habits, effort put into learning, attentiveness in the classroom and commitment to the course (Smrtnik

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Vitulić and Zupančič, 2010).

Further examination of mid-level trait ratings in our study reduced speculative interpretations about the predictive nature of robust personality traits and offered an insight into more specific aspects of personality which are actually related to students' academic achievement. Indeed, *Intelligence* which presented one of the constituent mid-level traits of conscientiousness in our study (as explained in the Method section) substantially and consistently (across the informant ratings) contributed to the prediction of GPA. Adolescents who are perceived (by one's self, mothers or peers) as learning oriented, eager to learn, and quick to understand tend to acquire academic content more effectively (e.g. Puklek Levpušček and Zupančič, 2009a) and may thus perform well at academic tests. Teachers may also grade students whom they perceive higher in intelligence better than those perceived lower in intelligence. As the predictive relations obtained do not preclude an association between students' perceived intelligence and their GPA in the opposite direction, it should also be noted that the adolescents' school grades may have served as a standard for their intelligence ratings by the informants. In relation to constituent traits of conscientiousness, our results further show that maternal ratings of their children's achievement orientation (focus on goal attainment, following tasks through completion, self discipline) and peer ratings of the target adolescents' low distractibility (good concentration, sustained directed attention, inhibition of attention to irrelevant stimuli) contribute to the GPA. It seems likely that the students' trait expression as perceived by others plays an important role in academic motivation and study habits which presumably affect achievement (Rothstein et al., 1994; Puklek Levpušček and Zupančič 2009a).

Consonant with previous findings on adolescents (Bratko et al., 2006; Laidra et al., 2007; Puklek Levpušček and Zupančič, 2009a), low extraversion over maternal and peer ratings, and low self-ratings on its specific trait of sociability in our sample significantly predicted GPA. Chamorro-Premuzic and Furnham (2003) proposed that introverts may benefit from being less sociable and outgoing (characteristic captured by the mid-level scale of Sociability in our study), and that warmth, considering others (referring to the Considerate ICID mid-level scale), novelty seeking, width of interests and imagination (encompassed by the Openness to Experience ICID mid-level scale) are perhaps associated with poor study habits. The results of our regression analyses with specific constituent traits of extraversion clarified that indeed both low levels of self-reported sociability and openness to experience, and low levels of mother-rated students' considerate behaviours significantly contribute to the link of extraversion with their GPA. We argue that less sociable, considerate and open adolescents may spend more time studying and perform more effectively in academic activities imposing demands on individual work in a quiet and unexciting setting, whereas their more sociable, considerate and open peers may be more engaged in a wide range of other activities. However, the latter may function well, for example, when involved in group academic projects and/or faced with school

tasks requiring speed because their behavioural tendencies would better fit those kinds of academic activities.

Although educational implications of agreeableness and neuroticism are not clear and our predictions based on robust traits were non-significant, self- and maternal ratings of students' low antagonism (a constituent of low disagreeableness) and self reported fear/insecurity (a neuroticism marker trait) were predictive of their GPA. Antagonistic adolescents, prone to confrontational behaviour indicated by being uncooperative, discourteous, rude and aggressive may exhibit behavioural problems in the classroom, making learning more difficult for them. They are also less pleasurable to work with in the classroom, more disliked by peers and teachers (Rubin, Bukowski and Parker, 1998), and may have difficulties due to opposing teachers in performing academic tasks. All these may contribute to their poorer academic achievement in comparison to less antagonistic students. In addition, adolescents who perceive themselves as easily upset, tending to be apprehensive and distressed, and lacking confidence (fear/insecurity) are graded higher by their teachers. The students prone to worry are concerned about doing well in general and may also tend to prepare thoroughly for school. As suggested by DiLalla, Marcus and Wright-Phillips (2004) moderate levels of general anxiety may serve to spur students to perform better academically while not being severe enough to interfere with their performance.

In accordance with findings of Chamorro-Premuzic and Furnham (2003) and the meta-analysis of O'Connor and Paunonen (2007) our results indicate that accuracy in the prediction of GPA by personality ratings could be increased by considering specific primary traits rather than the robust ones. Except for the reduced mid-level trait model with peer reports, the adolescents' robust trait scores consistently accounted for less variance in adolescents' GPA than their specific constituent traits. This may be due to the possibility that different students with identical robust trait scores may have very different mid-level trait scores but only some of these specific traits encapsulate "pure" personality variance shared with academic achievement.

The accounts of variance of adolescents' GPA by personality robust and mid-level trait scores in our study were also dependent on the informants providing personality data. In general, the observer ratings (mothers and peers) of the students' robust personality traits provided a more powerful prediction of the GPA than the students' self ratings but the prediction based on self-reports substantially improved when specific traits were addressed. A somewhat more accurate prediction of the GPA can also be claimed in regard to maternal and peer-ratings of specific rather than robust traits of the target adolescents. Nevertheless, relative to self- and peer reports, maternal ratings of their adolescent children's personality seem to be the strongest predictors of the students' GPA in the end of second grade of secondary school across the four models examined. The findings suggest that the mothers may have more thorough knowledge of their children's personality traits contributing to academic success in comparison to the adolescents' classmates (Smrtnik Vitulić and

Zupančič, 2010). Also, the validity of adolescents' self-reports may be undermined by socially desirable responding (Bratko et al., 2006) in spite of their advantage of capturing a unique perspective based on adolescents' own private experience whereas the reports by others are less susceptible to self-promotional strategies.

CONCLUSIONS

Following the recommendations of O'Connor and Paunonen (2007, p. 986) who proposed that "future investigations are strongly encouraged to assess narrow personality traits, in addition to broad personality factors, in order to maximize the prediction of academic achievement", our research suggests that accuracy in the prediction could be increased by relying on specific trait ratings rather than robust ones. The results of the present study provide support for predictive utility of mid-level personality traits for self- and maternal ratings but not for peer ratings. However, across the informant ratings the mid-level trait models provide an insight into the nature of the robust traits in predicting secondary students' GPA.

There are of course several limitations to our study. The data set included personality trait measures only, a single overall indicator of students' academic achievement in secondary school and the predictive relations between students' personality and their GPA were investigated within a specific educational system. In future, specific components of academic performance (e.g. specific course grades, external examinations) should also be examined instead of addressing overall indicators of academic success such as the GPA, along with other non-cognitive variables (e.g. motivation, interests and study habits). We believe that increasing knowledge of the factors predicting academic achievement has important implications for education: it allows educators to predict who will perform better or worse in a secondary school program, provides background to direct students towards programs in which they are likely to succeed, and enables teachers to adjust their classroom work to individual characteristics of students in order to optimize their academic performance, i.e. to compensate for identified students' weaknesses related to academic achievement and to nurture their strengths.

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OSOBINE LIČNOSTI VIŠEG I NIŽEG REDA KAO PREDIKTORI AKADEMSKOG POSTIGNUĆA ADOLESCENATA U SREDNJOJ ŠKOLI

Sažetak

U ovom istraživanju ispitivana je prediktivna vrijednost ličnosti višeg i nižeg reda kod adolescenata (M_{dob} = 16,8 godina) u objašnjenju akademskog postignuća. Podaci o ličnosti prikupljeni su putem samoprocjene, procjene od strane majke i vršnjaka na Inventaru o individualnim razlikama za djecu i adolescente. Četiri osobine ličnosti višeg reda prema samoprocjeni, procjeni od strane majke i vršnjaka predvidjele su 11, 27 i 18% varijance akademskog postignuća u srednjoj školi, a savjesnost (kod svih procjenjivača) i niska ekstraverzija (procjena od strane majke i vršnjaka) pokazali su se značajnim prediktorima. Nakon obrade 15 osobina ličnosti nižeg reda, predviđanje se povećalo na 30% (samoprocjena), 34% (procjena od strane majke) i 27% (procjena od strane vršnjaka). Subjektivna percepcija inteligencije učenika sustavno je doprinosila objašnjenju akademskog postignuća, kao i niski antagonizam na temelju samoprocjene i procjene majke, dok su ostali značajni prediktori bili vezani za specifičnog procjenjivača. Skraćeni modeli koji uzimaju u obzir značajne osobine višeg i nižeg reda smanjili su prediktivnu moć samprocijenjenih osobina višeg reda i osobina nižeg reda prema procjeni vršnjaka, ali su u manjoj mjeri doprinijeli točnosti ostalih modela. Istraživanje podupire prediktivnu korist osobina ličnosti nižeg reda kao prediktora akademskog uspjeha za samoprocjenu i procjenu od strane majke.

Ključne riječi: akademsko postignuće, adolescenti, razni procjenjivači, osobine ličnosti