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Explaining individual differences in scholastic behaviour and achievement

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Background. This paper presents results from the first wave of a longitudinal study examining the effects of various psychosocial variables on scholastic achievement and behaviour at school.

Aims. The main aim is to investigate the nature and strength of the effects of major individual difference dimensions on important outcome variables at school level, including academic performance, truancy, and antisocial behaviour.

Samples. Data were collected from a sample of 901 pupils on verbal ability (as a proxy for cognitive ability), personality traits, and a number of behavioural indices, including academic performance at 14 and 16 years, number of authorized and unauthorized absences, and exclusions from school due to antisocial conduct.

Methods. During the first stage of the study, seven schools participated in all three phases. Teachers administered a questionnaire battery in class according to a detailed protocol. Additional data were collected from school archives.

Results. Analysis of the data through multi-group (male and female puplis) structural equation modelling indicated a very strong effect of verbal ability on academic performance. Extraversion and psychoticism were negatively related to academic performance, although their effects were weak and moderated by gender. Verbal ability, extraversion, and psychoticism predicted absenteeism, truancy, and exclusions from school due to disruptive conduct. The latter three were negatively associated with academic performance.

Conclusions. The findings indicate that major individual difference dimensions like verbal ability and personality traits, have a strong influence on important outcome variables at school level, including academic performance, truancy, and antisocial behaviour. Without fully acknowledging the crucial role of individual differences in shaping behaviour and achievement at school, the timely identification of pupils at risk, and the development of effective intervention schemes will be difficult.

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For over a century, psychological and educational researchers have maintained an interest in the effective prediction of academic performance (e.g. Binet, 1903; Busato, Prins, Elshout, & Hamaker, 2000; Ebbinghaus, 1897; Galton, 1883; Goh & Moore, 1987; Harris, 1940; Savage, 1962; Terman, 1916; Willingham, 1974). In fact, it was partly this interest that prompted the development of psychometric theory and modern cognitive ability tests. Although IQ tests have consistently been shown to be powerful predictors of academic performance, it has often been argued that non-cognitive factors may also contribute to the prediction of academic success or failure.

Rolfhus and Ackerman (1996, p. 176) maintained that abilities are 'only one part of the complex causal framework that determines whether a student pursues the acquisition of knowledge and skills within a particular domain. Two other components of the equation are interests and personality traits'. Evidence in support of this hypothesis was provided by an extensive meta-analytic study in which Ackerman and Heggestad (1997) reported links between openness to experience (Factor V in the Big Five taxonomy) and crystallized cognitive ability. Thus, although personality traits and mental abilities are generally independent domains (e.g. Eysenck, 1994), it is possible that some traits may have a specific role to play in knowledge acquisition.

Cognitive ability and academic performance

Cognitive ability is the strongest predictor of academic performance in particular, and of educational level more generally (Jensen, 1998). IQ tests have been widely used both for research as well as for selection purposes across various educational levels, from primary school to university level (Jensen, 1980; Wolf, 1972; Zeidner & Matthews, 2000). In a meta-analysis of over 3,000 studies, Walberg (1984) found a correlation between cognitive ability and academic performance at school level of the order of about .70. Similar correlations have also been reported in more recent studies (e.g. Gagne & St Pere, 2002).

There is, however, a small body of research suggesting that the relationship between cognitive ability and academic performance may often be weaker than expected, sometimes even failing to reach statistical significance levels (Mehta & Kumar, 1985; Sanders, Osborne, & Greene, 1955; Seth & Pratap, 1971; Singh & Varma, 1995). Boekaerts (1995) notes that the correlation between cognitive ability and academic performance tends to decline as students progress in the educational system, dropping from about $r = .7$ in elementary school to as little as $r = .4$ in college (see also Jensen, 1998). Although shortcomings in the operationalization of the constructs or in the sampling procedures of some studies can account for the presence of anomalous findings, many researchers have emphasized the need to include variables other than cognitive ability in investigations of individual differences in academic achievement.

Personality traits and academic performance

Personality traits have been among the most salient non-cognitive variables to have been examined in relation to academic performance. Over 80 years ago, Whipple (1922, p. 262) concluded that it would be 'foolish (. . .) to suppose that native intelligence is the sole factor in academic success'. Webb (1915) proposed that 'persistence of motives' is directly relevant to intellectual performance. A modern version of this

construct was conceptualized in Digman's (1990) taxonomy as 'conscientiousness' or 'achievement-striving'.

Research into the relationships between personality traits and academic performance continued throughout the 1950s, but it was not until the advent of the Eysenckian model of personality (Barrett, Petrides, Eysenck, & Eysenck, 1998; Eysenck, 1947; Eysenck, 1997) that the various studies in the area began to examine with some consistency the same personality traits. The introduction of a personality paradigm was most beneficial in facilitating comparisons across different studies, which had previously been almost impossible due to the multitude of personality constructs involved. There exist hundreds of such constructs, many of which are virtually identical in every aspect except their labels (Block, 1995). Consequently, in order to be able to make a general statement about the potential impact of personality on academic performance, we must make appeal to general frameworks that reduce the vast number of narrow constructs into a small number of broad underlying dimensions.

The two most established personality taxonomies are the Eysenckian model, which posits three basic dimensions (psychoticism, extraversion, and neuroticism) and the five-factor model (e.g. Costa & McCrae, 1992), which posits five such dimensions (extraversion, neuroticism, agreeableness, conscientiousness, and openness-to-experience). The Eysenckian model is primarily hypothetico-deductive, aiming to explain *why* people differ, whereas the five-factor model is primarily descriptive, aiming to describe *how* people differ.

The present study is based on the Eysenckian model, which is a parsimonious personality system that reduces the multitude of narrow personality constructs to three broad dimensions. Its parsimony means that it is relatively easy to incorporate in complex modelling analyses, and renders it an ideal starting point for studies seeking to evaluate the role and impact of personality in different contexts. The broader five-factor model may be subsequently employed in order to determine the predictive value of its incremental variance. Barring certain exceptions (e.g. hypothesis testing), it is only after the role of the basic personality dimensions has been clarified that it makes sense to examine the potential relevance of narrower (lower-order) personality constructs.

The principal measurement instruments of Eysenckian personality are the revised version of the Eysenck Personality Questionnaire (EPQ-R; Eysenck, Eysenck, & Barrett, 1985; Barrett *et al.*, 1998), and the Eysenck personality profiler (EPP; Eysenck, Barrett, Wilson, & Jackson, 1992; Jackson, Furnham, Forde, & Cotter, 2000), with the former being conceptually and psychometrically superior to the latter (Petrides, Jackson, Furnham, & Levine, 2003). The Eysenckian model provides the basis for a number of similar three-factor models of personality and mood, such as those of Cloninger (1987) and Tellegen (1985). Table 1 presents some descriptive adjectives for high and low scorers on the three dimensions of the Eysenckian model.

Neuroticism tends to be a negative predictor of academic performance (Chamorro-Premuzic & Furnham, 2003a, 2003b; Furnham & Mudhurst, 1995; Goh & Moore, 1987; Rindermann & Neubauer, 2001; Sanchez-Marin, Rejano-Infante, & Rodriguez-Troyano, 2001). More generally, this dimension shows weak negative associations with performance on tests of ability (Ackerman & Heggestad, 1997). However, the literature relies heavily on university samples, and also includes many instances of non-significant associations (Entwistle & Entwistle, 1970; Furnham & Mitchell, 1991; Halamandaris & Power, 1999; Kline & Gale, 1971). The negative link between neuroticism and scholastic achievement has been explained primarily in terms of anxiety. Thus, it has been noted that test anxiety and fear of failure, both of which are typical of neurotic individuals,

Table 1. Descriptive adjectives for high and low scorers on psychoticism, extraversion, and neuroticism

	Psychoticism	Extraversion	Neuroticism
High (+)	Aggressive	Active	Anxious
	Hostile	Outgoing	Emotional
	Psychopathic	Sociable	Moody
	Schizophrenic	Talkative	Unstable
Low (−)	Altruistic	Quiet	Calm
	Conformist	Restrained	Confident
	Empathic	Unsociable	Relaxed
	Socialized	Withdrawn	Stable

affect performance negatively (Hembree, 1988; Zeidner, 1995). Some authors, notably Muller (1992), have argued that neuroticism may have long-term negative consequences for student self-perceptions, thereby leading to decreased academic self-efficacy and performance.

Extraversion also seems to be negatively associated with academic performance, although some of the literature suggests that third variables, such as cognitive ability and type of performance assessment, may moderate this relationship in a manner that can even change its sign to positive (Anthony, 1973; Furnham & Medhurst, 1995). Eysenck and Eysenck (1985) noted that age is a salient moderator of the relationship between extraversion and academic achievement, with introverts outperforming extraverts at all ages after about 13 years, but not before (see also Anthony, 1977). In general, introverts may have an advantage over extraverts in terms of being more focused, more systematic in their study habits, and better able to consolidate their learning (Entwistle & Entwistle, 1970; Sanchez de Marin *et al.*, 2001). Rolfhus and Ackerman (1999; see also Amelang & Ulwer, 1991; Humphreys & Revelle, 1984) found weak negative associations between extraversion and several different knowledge tests. They suggested that these may be related to differences in knowledge-acquisition time between introverts and extraverts, possibly because the latter tend to prioritize socializing over studying. As noted, however, several studies have reported a positive link between extraversion and performance, particularly in primary school settings (Anthony, 1973; Entwistle, 1972).

Psychoticism is a reliable negative predictor of academic performance (Aluja-Fabregat & Torrubia-Beltri, 1998; Chamorro-Premuzic & Furnham, 2003a; Furnham & Medhurst, 1995; Goh & Moore, 1987; Maqsud, 1993; Sanchez-Marin *et al.*, 2001). It has been suggested that psychoticism may negatively affect responsibility and interest in scholastic study, thus limiting academic success (Aluja-Fabregat & Torrubia-Beltri, 1998). Also, it has been shown that the maladaptive nature of high psychoticism scorers (e.g. their tendency to be uncaring towards others, and to reject implicit and explicit social norms) is counterproductive in academic settings (Halamandaris & Power, 1999; see also Haun, 1965). Moreover, many studies have demonstrated that conscientiousness (a major dimension in the five-factor model inversely related to psychoticism) is a strong positive predictor of scholastic achievement across several educational levels (Busato *et al.*, 2000; Chamorro-Premuzic & Furnham, 2002; De Raad, 1996).

In summary, psychoticism, extraversion, and neuroticism are each negatively associated with academic performance, albeit to differing extents. Thus, irrespective of the impact they might have on performance, it is likely to be in the opposite direction

to that of cognitive ability. Contrary to most studies, the present investigation examines the effects of cognitive ability and personality traits concurrently, rather than in isolation.

In addition to the main effects of cognitive ability and personality traits on academic performance, the present study aims to examine their interactions with gender. There are many reasons to expect gender differences in the perceptions and consequences of individual difference variables (see Eagly, 1995; Petrides, Furnham, & Martin, 2004). Moreover, it is well established that cognitive abilities are differentially valid predictors of academic performance across gender (Young, 1994). Depending on size and context, these interactions may or may not have significant practical implications. In order to determine the nature and importance of gender-specific effects in this study, most analyses are conducted on gender-specific data.

Cognitive ability, personality traits and behaviour at school

An important question is whether cognitive ability and personality traits affect educationally relevant behaviours other than academic performance. Several prospective longitudinal studies have identified relationships between individual difference variables, including low IQ and high impulsivity, and problematic behaviours at school, such as truancy and absenteeism (e.g. Farrington & Loeber, 2000; Fergusson & Horwood, 1998).

Fergusson, Lynskey, and Horwood (1995) found that truancy was very frequent (almost 40%) among 12- to 16-year-old pupils. They further showed that truancy is associated with a wide range of conduct problems, like juvenile offending and substance abuse (for a relevant meta-analysis, see Hallfors *et al.*, 2002). More generally, consistent displays of anti-conventional behaviours at school seem to be inextricably linked to low attainment (e.g. Farrington, 1995). Therefore, it is important to investigate in the present dataset the nexus of low cognitive ability, psychopathological tendencies (especially psychoticism), and poor scholastic attainment and behaviour.

Method

Participants

Questionnaire data were collected from 901 pupils as part of a large survey into psychosocial influences on scholastic behaviour and achievement at school. Petrides, Frederickson, and Furnham (2004) present some initial findings from this study. Approximately 52% of participants were male and 48% female. In the first wave of the study, all participants were Year 11 pupils in British secondary education (mean age of approximately 16.5 years).

Measures

Eysenck Personality Questionnaire – Revised (EPQ-R; Eysenck *et al.*, 1985). This is a benchmark personality questionnaire representing the best operationalization of the Eysenckian P-E-N system. It comprises 48 items that are responded to on a dichotomous scale (true/false). On this sample, the internal reliabilities for psychoticism ('Would you like other people to be afraid of you?'), extraversion ('Are you a talkative person?'), and neuroticism ('Are you a worrier?') were .65, .85, and .78, respectively.

Verbal reasoning test

This tailor-made test was developed by the Department of Assessment and Measurement at the National Foundation for Educational Research. It measures primarily crystallized cognitive ability, and is used by the educational authority that supported this study (see Procedure). The reliability of scores on this test (KR20) is usually in the order of .97 (National Foundation for Educational Research, personal communication). The test is administered three times to each pupil and the score that the educational authority uses (which was made available to us) represents the average of the best two performances. On this sample, the mean of this variable was 111.8 ($SD = 15.30$). It should be noted that the Verbal Reasoning Test is a good proxy for general cognitive ability.

Key Stage 3 assessment (KS3) results

In the UK, pupils are statutorily assessed at the end of each of the four stages of the national curriculum, which is followed by all publicly funded schools. Pupils will normally be about 14 years old when national testing occurs at the end of Key Stage 3. At this stage, attainment in the three core national curriculum subjects of English, maths, and science is assessed.

General Certificate of Secondary Education (GCSE)

GCSEs are the principal means of assessing pupil attainment at the end of compulsory secondary education at 16 years. Assessment of GCSEs is usually by external examination and coursework, with the balance towards the former. Assessed subjects include English, maths, science, religion, arts, music, design and technology and so fourth. Some of these are compulsory, whereas others are optional. GCSEs are graded from A* to G. Attainment at Grades A* to C is at Level 2 of the UK national qualifications framework, while attainment at Grades D to G is at Level 1. Progression to further education and training beyond 16 years is closely linked to Level 2 attainment, with entry requirements often stipulating a minimum number of GCSEs at Grade C or above.

Authorized absences

Information on the number of authorized absences during the school year was available for 363 pupils.

Unauthorized absences

Information on unauthorized absences (truancy) for the same period was available for 391 pupils. Of those, 48 had one or more unauthorized absences.

Exclusions

Information on the number of exclusions was available for 533 pupils. Of those, 15 had been excluded from school for 1 or more days.

Procedure

The study was conducted under the auspices of the Buckinghamshire County Council Educational Authority (UK). A number of secondary schools in the county were contacted, of which seven participated across all phases of the study. The questionnaire

battery was administered by teachers in class according to a detailed protocol. The battery began with a letter to the pupils, providing information about the study, offering assurances about confidentiality, and requesting their participation. Additional data were retrieved from school databases.

Results

Table 2 presents the means, standard deviations, and correlations for key variables in the study, broken down by gender.

Table 2. Gender-specific descriptive statistics and correlations for key variables in the study

	IQ	EXT	NEU	PSY	KS3	GCSE	Mean (*SD*)
IQ	–	−.151**	.076	−.086	.874**	.843**	113.13 (14.96)
EXT	−.118*	–	.327**	.052	−.200**	−.255	8.56 (3.16)
NEU	.012	−.351*	–	−.011	.088	.105	5.56 (3.12)
PSY	.103	.025	−.019	–	−.095	−.137*	3.81 (2.31)
KS3	.885**	−.181**	.046	.053	–	.904**	17.36 (3.30)
GCSE	.850**	−.188**	.031	−.038	.925**	–	15.74 (4.20)
Mean	112.73	9.60	6.82	2.78	16.75	16.03	–
(*SD*)	(15.09)	(2.85)	(2.84)	(1.92)	(2.98)	(4.52)	

Note. Information above the diagonal is for male students ($N = 321$). Information below the diagonal is for female students ($N = 297$). Variable abbreviations as in Figure 1. *$p < .05$, **$p < .01$.

Structural equation model

The data on academic achievement were analysed through a multi-group (male and female) structural equation model. English, maths, and science taken at Key Stage 3 level were the indicators of a latent construct labelled KS3, whereas the same subjects taken at GCSE level were the indicators of a latent construct labelled GCSE. In terms of exogenous variables, the initial model involved three multiplicative terms in addition to verbal ability and the three personality dimensions (psychoticism, extraversion, and neuroticism). These modelled three, two-way bilinear interactions between verbal ability and each of the personality dimensions. Some of these variables were not related to either KS3 or to GCSE and were subsequently removed from the model. The final model, with dashed lines indicating differential (with respect to statistical significance) gender effects is shown in Figure 1. The model provided a good fit to the data: $\chi^2_{(53)} = 106.76$, $p < .01$, CFI = .99, SRMR = .03, RMSEA = .06. The completely standardized common metric parameters are also presented in Figure 1.

Before we discuss specific gender differences in the paths of the model, a general description of the effects is provided. As can be seen in Figure 1, verbal ability had a very strong direct effect on KS3, but not on GCSE, which it affected only indirectly through KS3. With respect to the personality variables, extraversion and psychoticism (but not neuroticism) were related to achievement, although their effects were limited compared with those of verbal ability. There was also a statistically significant, albeit weak, interaction between verbal ability and extraversion for boys, but not for girls. The model accounted for most of the variance in KS3 (86% and 90% for boys and girls, respectively) and GCSE (91% and 94% for boys and girls, respectively).

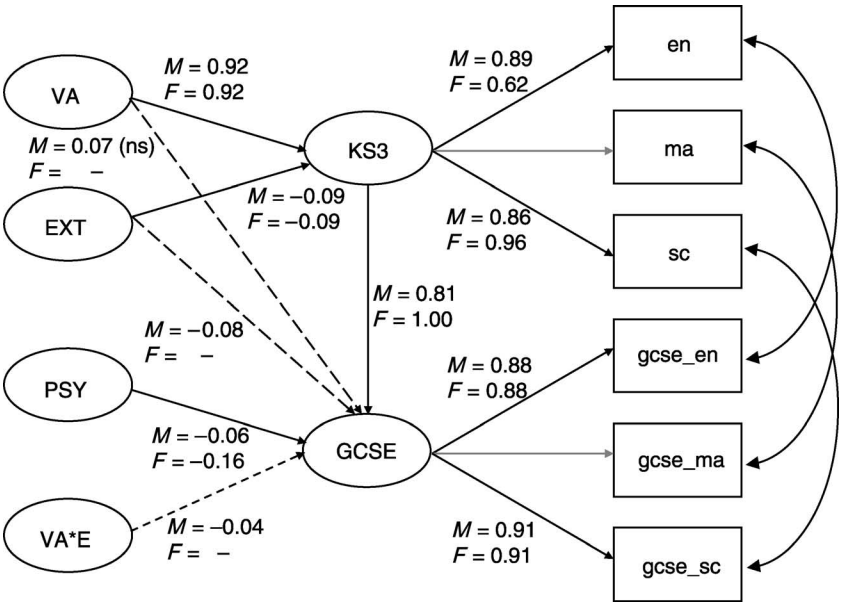

Figure 1. Structural equation model with standardized maximum-likelihood parameter estimates for male and female students. Dashed lines indicate effects that were non-significant in the female sample. EN = English, MA = Maths, SC = Science, KS3 = Key Stage 3 assessment (academic performance at 14 years), GCSE = General Certificate of Secondary Education assessment (academic performance at 16 years), VA = Verbal Reasoning Test, EXT = Extraversion, PSY = Psychoticism, VA*E = Verbal Ability * Extraversion interaction.

Chi-squared change tests

In order to test for gender differences in the model, a series of cumulative constraints were applied to each of its paths. The results of this analysis are reported in Table 3.

Table 3. Gender-based invariance tests for the structural equation model in Figure 1

Models	χ^2	χ^2 *df*	$\Delta\chi^2$	Δ *df*	*p*
1. Baseline	106.76	53	–	–	$<.01$
2. KS3 → English	129.09	54	22.33	1	$<.01$
3. KS3 → Science	110.80	54	4.04	1	$<.05$
4. GCSE → English	107.72	54	0.96	1	*ns*
5. GCSE → Science	108.68	55	1.92	2	*ns*
6. IQ → KS3	109.46	56	2.70	3	*ns*
7. Extraversion → KS3	109.50	57	2.74	4	*ns*
8. Psychoticism → GCSE	115.65	58	8.89	5	$= 0.055$
9. KS3 → GCSE	114.30	58	13.56	6	$<.05$

With respect to the measurement part of the model, it can be seen in Table 3 that at least two of the three indicators of KS3 performance (English and Science) are non-invariant across gender, with the male loadings being significantly higher than the female loadings, especially in the case of English. The corresponding indicators of GCSE performance were invariant. Regarding the structural part of the model, the path from

extraversion into KS3 was invariant. The statistical test of the path from psychoticism into GCSE was more complicated. The marginal non-significance of this path in the cumulative $\Delta\chi^2$ test ($p = .055$; see Table 3) is likely due to the fact that the χ^2 value is, in this case, distributed over five degrees of freedom. In contrast, the test based on one degree of freedom was clearly significant, $\Delta\chi^2_{(1)} = 6.15, p < .05$, thus indicating that the parameter should be allowed to take different values in the two samples. Lastly, the path from KS3 to GCSE was also non-invariant, being somewhat stronger for female students than for male students (see Figure 1).

Verbal ability × extraversion interaction

The model in Figure 1 indicates that, in the male sample only, extraversion moderates the relationship between verbal ability and GCSE performance. Thus, male introverted (-2 *SD*) pupils with low verbal ability scores (-2 *SD*) perform considerably better than their extraverted ($+2$ *SD*) counterparts. As verbal ability increases, however, the influence of extraversion begins to diminish until it reaches a point (verbal ability $+2$ *SD*) where it does not affect GCSE performance. In terms of coefficients, the β weight of extraversion on GCSE at verbal ability $= -2$ *SD* was -0.19, whereas the β at verbal ability $= +2$ *SD* was 0.01. For male pupils with mean verbal ability scores, the corresponding β was -0.09.

Absenteeism

Female students had significantly higher attendance levels than male students, $F_{(1,351)} = 11.16$, $p < .01$; $\text{Mean}_{\text{fem}} = 92.67$, $\text{SD}_{\text{fem}} = 8.14$; $\text{Mean}_{\text{male}} = 89.41$, $\text{SD}_{\text{male}} = 9.43$. After adjustments for verbal ability and personality trait scores, however, the gender difference was no longer significant, $F_{(1,283)} = 1.47$, $p = ns$; $\text{Mean}_{\text{fem}} = 92.51$, $\text{SE}_{\text{fem}} = 5.78$; $\text{Mean}_{\text{male}} = 91.12$, $\text{SE}_{\text{male}} = 9.21$.

To investigate the extent to which verbal ability and personality traits influence attendance levels at school, a standard multiple regression was performed. After the removal of four outliers (standardized residuals > 3.5 *SD*), the regression was significant, $F_{(4,286)} = 12.28, p < .01$, and accounted for 13.5% of the variance. Verbal ability was a significant positive predictor ($\beta = 0.325$, $t = 5.91$, $p < .01$), whereas extraversion and psychoticism were significant negative predictors ($\beta = -0.128$, $t = 2.16$, $p < .05$ and $\beta = -0.117$, $t = 2.13$, $p < .05$, respectively) of attendance percentages.

A more detailed picture emerged when the data were analysed separately for male and female students. For the male pupil data, neither the overall regression nor any of the individual predictors reached significance, $F_{(4,83)} = 1.19$, $p = ns$; $\beta_{\text{VA}} = 0.150$, $\beta_{\text{P}} = -0.056$; $\beta_{\text{E}} = -0.173$, and $\beta_{\text{N}} = -0.007$. In contrast, for the female data, after the removal of four outliers (standardized residuals > 3.5 *SD*), the regression was significant, $F_{(4,192)} = 9.17, p < .01$), and accounted for 14.3% of the variance. Verbal ability was a strong positive predictor ($\beta = 0.352$, $t = 5.23$, $p < .01$), whereas psychoticism was a negative predictor of attendance levels ($\beta = -0.133$, $t = 1.99$, $p < .05$). Extraversion also approached significance ($\beta = -0.134$, $t = 1.88$, $p = .06$), whereas neuroticism did not ($\beta = -0.070$, $t = 0.99$, $p = ns$).

Because the male and female samples were unequal, the results from the gender-specific regressions above, especially the significance levels, should be interpreted with caution. In particular, we note that both verbal ability and extraversion are likely to influence attendance levels in male pupils, with positive and negative effects, respectively. A larger sample size may reveal effects that are not only statistically

significant, but also stronger than those observed in the female sample, especially in the case of extraversion.

Truancy and exclusions

For truant pupils, the number of unauthorized absences was regressed only on the three personality traits, as verbal ability scores were, in many cases, unavailable. This regression was not statistically significant, $F_{(3,40)} = 1.89$, $p = ns$. Due to the small number of pupils with exclusions from school, the relevant analyses involved chi-squared tests of independence based on residualized scores to avoid reanalyzing overlapping variance. Pupils with low verbal ability were significantly more likely to have been excluded from school, $\chi^2_{(1)} = 7.54$, $p < .01$, as were pupils with high psychoticism scores, $\chi^2_{(1)} = 5.10$, $p < .05$. Extraversion and neuroticism were not related to exclusions, $\chi^2_{(1)} = 2.02$, $p = ns$ and $\chi^2_{(1)} = .52$, $p = ns$, respectively.

Absenteeism, truancy, exclusions and academic performance

To examine whether absenteeism, truancy, and exclusions are related to academic performance, a series of partial correlations were computed controlling for the effects of gender, personality, and verbal ability. The correlation between attendance percentages and KS3, partialling out gender, verbal ability, and the three personality traits was statistically significant, $r_{(267)} = .17$, $p < .01$. The corresponding correlation for GCSE was also significant, $r_{(275)} = .24$, $p < .01$. Analogous correlations (i.e. with gender, verbal ability, and personality partialled out) were computed for truancy and exclusions. Dichotomized truancy scores were not related to KS3 performance, but were negatively related to GCSE performance, $r_{(294)} = -.14$, $p < .05$. Similarly, dichotomized exclusion scores were not related to KS3 performance, but were significantly related to GCSE performance, $r_{(415)} = -.13$, $p < .05$.

Discussion

This study examined the combined influence of verbal ability, as a proxy for cognitive ability, and personality traits on academic performance and behaviour at school. In addition, it explored how absenteeism, truancy, and antisocial conduct can affect achievement. Below, we discuss in detail the major findings and their implications.

Verbal ability and academic performance

As expected, verbal ability was a powerful predictor of academic performance, a result that accords well with a large body of existing empirical evidence (Jensen, 1998; Kuncel, Hezlett, & Ones, 2001). The structural equation model showed that the effect of verbal ability on academic performance at GCSE level (i.e. when the pupils are about 16 years old) is entirely mediated through academic performance at KS3 level (i.e. when the pupils are about 14 years old).

The effect of verbal ability on KS3 is direct and in the order of 0.92 for both male and female pupils. In contrast, its effect on GCSE is indirect and varies somewhat across gender (about .75 and .92, for boys and girls, respectively). This suggests that verbal ability does not add anything over and above KS3 in the prediction of GCSE performance and that a high verbal ability does not confer incremental advantages in academic performance over the years. Rather, academic performance remains stable, at least over

the time span examined in this study, with its level being primarily a function of cognitive ability. Thus, those pupils who performed well in the KS3 exams also performed well in the GCSE exams. An interesting point is that male pupil performance is more likely to be influenced by personality traits at 16 years (GCSE level) than 2 years earlier. The impact of these traits is negligible at 14 years (KS3 level) probably because pupils are too young at that point to be able to select and engage in situations or behaviours of their choice (e.g. extraverts spending more time away from home with friends).

The results on verbal ability are in line with previous findings demonstrating the strong predictive validity of IQ tests (e.g. Mackintosh & Mascie-Taylor, 1986). It should be noted that the verbal ability effects in this study are considerably stronger than those typically reported in the literature (usually ranging between .5 and .7; see Mackintosh, 1998). This is due to a combination of factors, including the breadth of the present sample and the use of data analytic techniques that take measurement error into account.

Personality and academic performance

Compared with verbal ability, the impact of personality traits on academic performance was weak. Indeed, neuroticism did not have any significant influence on performance either at the KS3 or at the GCSE level. Moreover, most personality effects were gender-specific. In fact, a theoretically expected negative path from extraversion into KS3 was the only gender-invariant personality effect in the model. Thus, at GCSE, psychoticism had a negative impact on performance, which was significantly more pronounced in the female sample. In the male sample only, extraversion influenced GCSE performance both through a direct negative effect, as well as through a bilinear interaction with verbal ability.

The presence of an interaction suggests that male pupils with low verbal ability are especially likely to exhibit poor academic performance if they are extraverted. In contrast, their high verbal ability peers will perform well academically, irrespective of their standing on the extraversion–introversion dimension. Although this moderating effect concerns male pupils only, it does challenge the conventional view that extraversion is always detrimental to academic performance from adolescence onwards. At least for boys, it seems that the negative impact of extraversion on performance depends on the individual's cognitive ability, with low scorers being more likely to benefit from an introverted disposition.

On average, pupils with low verbal ability scores will not find it easy to meet course requirements, which may alienate them from their educational environment. In such cases, the data suggest that increased extraversion levels can be especially detrimental to achievement. Extraverts are pleasure-seeking and outgoing, which, in combination with a school environment that they perceive as alienating, will direct their interests to activities that are not conducive to educational attainment. Interestingly, certain correlates of extraversion, like wider social support networks (Swickert, Rosentreter, Hittner, & Mushrush, 2002), can have a positive impact on the academic performance of pupils with low cognitive ability. However, this would depend on many other qualities, dispositions, and self-perceptions (e.g. trait emotional intelligence; see Petrides *et al.*, 2004).

Of the two dimensions with psychopathological origins in the Eysenckian model (neuroticism and psychoticism), only the latter had a significant effect on academic performance. Research into the relationship between psychoticism and academic

performance has revealed relatively weak, albeit consistent, negative associations (e.g. Goh & Moore, 1987; Sanchez-Marin *et al.*, 2001). In this study, there was a negative effect, which was stronger for female students than for male students. At school level, a tendency to be nonconformist, tough-minded, and emotionally detached will affect performance negatively. However, because psychotic behaviours are widely perceived as non-feminine, female pupils exhibiting such behaviours are likely to experience disproportionate penalties.

Individual differences in behaviour at school

The results showed that high verbal ability, low psychoticism, and low extraversion are conducive to attendance, particularly for girls. If these findings are replicated, it would be worthwhile to ascertain precisely why some pupils, especially girls with low verbal ability or high psychoticism scores, tend to have more authorized absences from school. This is important because attendance levels are positively correlated with academic performance, even after partialling out verbal ability and personality scores. For those pupils who had been absent without authorization, neither verbal ability nor any of the three Eysenckian dimensions was related to the number of unauthorized absences. It is worth noting that in a similar analysis, Petrides *et al.* (2004) found that unauthorized absences were negatively related to trait emotional intelligence. Regarding exclusions from school due to serious breaches of discipline, pupils who had been excluded for 1 or more days were significantly more likely to have below average verbal ability scores and above average psychoticism scores. Overall, these findings are consistent with evidence showing that low cognitive ability and psychotic-impulsive tendencies represent key risk factors for juvenile delinquency and violence (e.g. Farrington & Loeber, 2000; Loeber *et al.*, 2001).

There is little doubt that problematic behaviours, such as absenteeism, truancy, and unruliness, are implicated in poor academic performance. In the present study, this was manifested through a series of statistically significant associations, controlled for cognitive ability and personality, between absenteeism, truancy, and exclusions from school, on the one hand, and performance at KS3 (14 years old) and GCSE (16 years old), on the other. Setting aside their negative effects on attainment, conduct problems at adolescence constitute early risk factors, often leading to serious offences in later life (Farrington, 1995).

Implications for educational practice

The findings of this study would appear to support a number of key elements in a major recent government initiative, involving the establishment of in-school Learning Support Units, aimed at secondary aged pupils who are 'disengaged with education' (Hayward, 2002). Although government guidance makes it clear that curriculum and achievement should be the main focus, it is also important to tailor the provision to individuals and to include strategies to improve behaviour, self-esteem, social skills, and personal relationships. The range of strategies discussed include both those designed to change an individual's established cognitive and behavioural styles directly, and those designed to encourage alternative behaviour through altering environmental contingencies, such as the accreditation frameworks currently in place.

These different types of strategies reflect different views about the malleability of personality dimensions and other temperamental traits. For example, the first set of strategies would directly target the interpersonal hostility and affective insensitivity

associated with high scores on the Psychoticism scale. While much recent interest has been focused on intervention programmes of this type, little empirical evidence on their effectiveness is currently available (Zins, Travis, & Freppon, 1997).

The second set of strategies focus on designing environmental interventions that take into account individual differences in cognition, affect, and behaviour. For example, Romero, Luengo, and Sobral (2001) noted that individual differences in sensitivity to signals of reward and punishment are related to antisocial behaviour. They predicted that better educational and social outcomes would be achieved where programmes are designed with such individual differences in mind. However, these predictions have yet to be adequately tested. While it is not yet clear whether both, either, or neither of these types of intervention strategies are effective, findings such as those reported herein highlight the need for further evaluation research in these areas.

Conclusion

Social behaviours with important long-term implications, including educational attainment, can be predicted from variation along a small number of individual difference dimensions. The present study demonstrates that verbal ability affects a wide range of behaviours, some of which are unrelated to attainment *per se* (e.g. absenteeism). It also shows that the basic personality dimensions make their own distinct contribution in shaping behaviour at school.

The three dimensions examined in this study are not exhaustive of the entire personality domain. There exist many other personality-related variables (e.g. aspirations, interests, motivation) that may also influence academic performance and behaviour at school, perhaps incrementally over the Eysenckian dimensions. The present findings suggest it is unlikely that such variables will have substantial incremental effects on academic achievement, where most of the variance is accounted for by individual differences in cognitive ability. However, it is possible that they may affect the performance of specific groups of pupils that are homogeneous in ability. Overall, the possibility that personality constructs, other than those examined here, may have a significant role to play in educational contexts should not be discounted (see Petrides *et al.*, 2004).

In light of a growing body of empirical evidence revealing a high degree of stability in traits, abilities, and behaviours, the ability to identify individuals at risk is becoming increasingly important. All of the available evidence points to an important role for individual differences research in the quest for timely identification and effective intervention.

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