The relationship between personality traits, subjectively-assessed and fluid intelligence

Tomas Chamorro-Premuzic [a], Joanna Moutafi [b], Adrian Furnham [b,*]

[a] *Department of Psychology, Goldsmiths College, London, UK*
[b] *Department of Psychology, University College, 26 Bedford Way, London WC1E OAP, UK*

Abstract

This study looks at the relationship between personality traits (Big Five), fluid (Gf) and subjectively-assessed (SAI) intelligence. British and American university students together ($N = 186$) completed the NEO-PI-R (Costa & McCrae, 1992) and the Raven's Standard Progressive Matrices (Raven, Raven & Court, 1998) after estimating their intellectual ability on a normal distribution. As predicted, Openness to Experience was modestly but significantly related to both SAI ($r = .20$) and Gf ($r = .21$). SAI was also significantly correlated (negatively, $r = -.21$) with Neuroticism. Regressing the Big Five personality traits onto SAI scores, showed that these personality traits were found to account for between 9% and 16% of the variance in SAI. At the same time, SAI (and Openness) was a significant correlate and predictor of Gf, which suggests that SAI may be a mediating concept between personality and psychometric intelligence. Results are discussed with regard to current and future research perspectives on the relationship between personality and intelligence.
© 2004 Elsevier Ltd. All rights reserved.

Keywords: Openness; Big Five traits, subjectively-assessed and psychometric intelligence

* Corresponding author. Tel.: +44 20 7679 5395; fax: +44 20 7436 4276.
E-mail address: a.furnham@ucl.ac.uk (A. Furnham).

1. Introduction

A central question that has returned to the field of individual differences in the last 10 years, is whether and how personality traits and intellectual ability are, or are not, related (Hofstee, 2001). Although this question is nearly as old as the study of intelligence and personality (see for instance Cattell, 1941; Spearman, 1927; Webb, 1915; Wechsler, 1950; Whipple, 1922), both constructs have been traditionally investigated independently, prompting the development of different methods and unrelated theories (Ackerman & Heggestad, 1997; Cronbach, 1949; Hofstee, 2001; Zeidner & Matthews, 2000).

Whereas general intellectual ability appears to be theoretically unrelated to non-cognitive traits (Brebner & Stough, 1995; Eysenck, 1994; Zeidner & Matthews, 2000), traits have been proven to relate to test performance and, since intellectual ability is measured through performance (ability/ IQ), it is not surprising that traits are significantly correlated with intelligence. There is longstanding experimental evidence suggesting that Neuroticism (trait anxiety), for instance, is likely to affect performance negatively on examinations (Eysenck, 1982; Humphreys & Revelle, 1984; Wells & Matthews, 1994; Wine, 1982). Furthermore, individual differences in Extraversion/Introversion have been found to relate to different test taking styles (Eysenck, 1971; Furnham, Forde, & Cotter, 1998a, Furnham, Forde, & Cotter, 1998b; Rawlings & Carnie, 1989; Robinson, 1985). Despite this, meta-analytical studies (notably Ackerman & Heggestad, 1997) have shown that personality traits are, at best, only modestly related to general intelligence. Accordingly, personality variables should be considered with IQ as predictors of other, more general or long term, types of everyday performance (i.e., occupational, academic success) (Anastasi, 1998; Chamorro-Premuzic & Furnham, 2003a, 2003b; Hofstee, 2001; Petrides, Chamorro-Premuzic, Fredrickson, & Furnham, in press).

A trait which has generated much controversy with regard to understanding personality-intelligence relationships, is Openness to Experience (see Brand, 1994). Even in meta-analysis, this personality factor is consistently shown to be moderately and significantly correlated with intelligence, particularly with its crystallized aspects (Gc) ($r = .30$ in Ackerman & Heggestad, 1997). Unlike Neuroticism and Extraversion, Openness appears to be conceptually directly related to intelligence, rather than merely affect test performance (psychometric intelligence). According to Costa and McCrae (1992), Openness refers to aesthetic sensitivity, awareness of one's emotions, preference for novelty and non-traditional values, fantasy tendency, and ideas. However, other researchers have preferred to refer to Openness as Intellect or Culture, interpreting this personality trait in terms of introspective reflection and intellectual knowledge (see Goldberg, 1994; Johnson, 1994; Saucier, 1994). Openness is therefore associated with intellectual curiosity, vivid imagination, and behavioral flexibility (McCrae & Costa, 1997), but also with understanding ability, knowledge in science, change and autonomy (see Ashton, Lee, Vernon, & Jang, 2000). Since these variables are assessed through self-report inventories, it has been implied that Openness could be conceptualized as a self-report measure of intelligence, especially of Gc (Ackerman & Goff, 1994; Goff & Ackerman, 1992).

On the other hand, the fact that (like other personality traits) Openness is assessed through typical, rather than maximal, performance, may suggest that this personality trait could be related to other variables (e.g., interests, curiosity, creativity, motivation) that are relevant to everyday processes of knowledge formation. This idea was first present in Cattell's (1971, 1987) investment

theory and was later re-elaborated in Ackerman's (1996) PPKI (i.e., intelligence as processes, personality, knowledge and interests) theory.

A few recent papers have also examined the relationship between personality inventories (notably the NEO-PI-R) and single self-estimates or indicators of subjectively-assessed intelligence (SAI) (Furnham, Kidwai, & Thomas, 2001; Furnham, Chamorro-Premuzic, & Moutafi, in press). These are usually obtained by asking participants to rate their intellectual ability on an appropriately labeled bell curve (presenting them with a normal distribution of IQ scores, their means and standard deviations as well as labels for certain values, e.g., ''gifted'', ''retarded'', etc.) (Furnham, 2001). Significant, albeit modest, correlations were found between SAI and Neuroticism (negative), Agreeableness (negative), and Openness to Experience (positive). Furthermore, regressional analyses indicated that SAI can be significantly predicted by these personality traits, and it was suggested that non-cognitive variables may affect/distort people's insight into their intellectual ability (Furnham et al., in press) (see also Furnham et al., 2001). SAI may therefore be important (both conceptually and psychometrically) with regard to understanding the personality-intelligence crossroads.

The present study will examine the relationship between personality traits, SAI, and psychometric intelligence in a combined sample of British and American undergraduates (from diverse courses and universities). Regarding the relationship between SAI, psychometric intelligence, and personality traits, several sets of hypotheses can be stated:

H1. SAI will be correlated with, and predicted by, Neuroticism (negatively) (H1$_a$), Extraversion (positively) (H1$_b$), Agreeableness (negatively) (H1$_c$), and Openness to Experience (positively) (H1$_d$).

H2. SAI will be also expected to correlate with psychometric intelligence (Gf). This would confirm previous findings (Furnham et al., in press, 2001; Furnham & Rawles, 1999; Paulhus, Lysy, & Yik, 1998; Reilly & Mulhern, 1995).

H3. Finally Openness will be modestly but significantly related to Gf (between $r = .10$ and $r = .20$) (see Ackerman & Heggestad, 1997; Ashton et al., 2000).

2. Method

2.1. Participants

A total of 182 undergraduate students from British and American universities participated in this study. Of these, 49 were male and 133 were female. Their age ranged from 18 to 53, with a mean of 19.79 and a standard deviation of 3.46. The participant aged 53 was excluded from the analysis as he was considered to be an outlier (with regard to age). Consequently, 49 males and 132 females were included in the statistical analysis, their age ranging from 18 to 38, with a mean of 19.58 and a standard deviation of 2.22 years. Students participated in this study as part of two lectures on personality and intelligence assessment and received individual feedback on their personality and intelligence scores (this occurred one month after the lectures).

2.2. Measures

The NEO Personality Inventory—Revised (NEO-PI-R; Costa & McCrae, 1992). This 240-item, non-timed questionnaire, measures 30 primary personality traits and its underlying "Big Five" personality factors, i.e., Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness. Items involve questions about typical behaviors or reactions, which are answered on a five-point Likert scale, ranging from "strongly disagree" to "strongly agree". The manual shows impressive indices of reliability and validity.

Raven's Standard Progressive Matrices (Raven, Raven, & Court, 1998). This is a 60-item, timed (20 min) ability test, measuring educative ability, which is a component of Gf. Each of the items consists of a box that contains one or several figures, which are related by specific rules. An area of the box is missing and participants have to distinguish the missing part among five or seven similar figures, by deducing the rules of each box. The 60 items are divided into five groups of 12 items, with increasing level of difficulty within each group. The manual reports that studies on a wide range of age groups, cultural groups and clinical as well as normal populations provide abundant evidence for the test's reliability and validity (Raven et al., 1998).

2.3. Procedure

The testing procedure occurred on two occasions. On both occasions, participants were tested simultaneously in a large lecture theatre in the presence of five examiners who ensured the tests were appropriately completed. Participants were first requested to report their SAI. In order to standardize SAI, the normal distribution of intelligence scores was presented to the participants, with a range of 0–155, including labels for "retardation", "low average", "average", "high average" and "gifted" (see Furnham, 2001). Participants were then administered the Raven's Standard Progressive Matrices. Although the administration time recommended in the manual is 20 min, participants were given 15 min in order to avoid any ceiling effects (these have been encountered by the authors during previous testing experience). Participants then completed the NEO-PI-R, for which there was no time limit. A week after the testing procedure, feedback was individually given to each participant on both their personality traits and the IQ results.

3. Results

Correlations between Raven's test scores (Gf), SAI, the Big Five personality traits (and sub-facets), gender and age are presented in Table 1. Confirming H2, there were significant correlations between Gf and SAI ($r = .22$, $p = .01$). Of the Big Five factors, Openness correlated significantly with both Gf ($r = .21$, $p = .01$) and with SAI ($r = .20$, $p = .01$) (this confirmed H3d and H1d, respectively), and Neuroticism correlated significantly with SAI ($r = -.20$, $p = .01$) (which confirmed H1a). Against initial predictions, there were no significant correlations between SAI and Agreeableness (H1b was not confirmed), or Extraversion (H1c was not confirmed).

Of the Big Five sub-facets, Gf correlated significantly with aesthetics ($r = .20$, $p = .01$), ideas ($r = .17$, $p = .03$) and values ($r = .21$, $p = .01$) (all facets of Openness to Experience). Other sub-facets were not significantly correlated with Gf. Sub-facets were also examined with regard to

Table 1
Correlations between Gf, SAI, the Big Five, sex and age

	SAI	Gf
SAI		.22[**]
Anxiety	−.23[**]	−.08
Anger-hostility	−.08	−.01
Depression	−.15	.02
Self-conscious	−.16[*]	.01
Impulsiveness	−.07	−.05
Vulnerability	−.16[*]	.06
Neuroticism	−.20[*]	−.01
Warmth	−.01	−.07
Gregariousness	−.05	−.04
Assertiveness	.14	−.01
Activity	.17[*]	.00
Excitement seek	.13	.03
Positive emotions	−.02	−.00
Extraversion	.08	−.02
Fantasy	.13	.08
Aesthetics	.06	.20[**]
Feelings	.05	.13
Actions	.10	.06
Ideas	.29[**]	.17[*]
Values	.20[*]	.21[**]
Openness	.20[*]	.21[**]
Trust	.02	.12
Straightforward	−.12	−.03
Altruism	.03	−.01
Compliance	−.02	.08
Modesty	−.15	−.03
Tender-mind	−.03	.00
Agreeableness	−.08	.01
Competence	.15	−.01
Order	−.07	.04
Dutifulness	.10	−.01
Achievement-striv	.07	−.04
Self discipline	.08	−.01
Deliberation	−.01	−.05
Conscientiousness	.07	−.02
Sex	.02	−.00
Age	.04	.01

[*] $p < .05$.
[**] $p < .01$.

SAI, which correlated significantly with three Neuroticism sub-facets, namely anxiety ($r = -.23$, $p = .003$), self-consciousness ($r = -.16$, $p = .04$), and vulnerability ($r = -.16$, $p = .04$), one Extraversion sub-facet, namely activity ($r = .17$, $p = .03$), and two Openness sub-facets, namely ideas ($r < .001$) and values ($r = .20$, $p = .01$). There were no significant correlations between the demographic factors (gender and age) and Gf or SAI.

3.1. SAI

In order to investigate whether personality predicts SAI, two hierarchical regressions were performed, with SAI as the dependent variable. The independent variables were the Big Five personality traits for the first regression model, and the Big Five, sex and age for the second regression model. Standardised Beta coefficients and t-values for both models are presented in Table 2.

Confirming our expectations (H1e) and the overall correlational pattern, the first model was significant ($F(5, 157) = 3.83$, $p < .01$, with Adj. $R^2 = .08$). Significant predictors of SAI were Neuroticism ($\beta = -.23$, $t = -2.73$, $p < .01$), Openness ($\beta = .26$, $t = 3.12$, $p < .001$) and Agreeableness ($\beta = -.16$, $t = -1.98$, $p = .05$). The second model was also significant ($F(7, 132) = 2.74$, $p = .01$, with Adj. $R^2 = .08$). Significant predictors of SAI were again Neuroticism ($\beta = -.23$, $t = -2.37$, $p = .02$), Openness ($\beta = .26$, $t = 2.83$, $p < .01$) and Agreeableness ($\beta = -.23$, $t = -2.68$, $p < .01$).

One further regression model was tested, using only Neuroticism, Openness and Agreeableness as the independent variables, to investigate whether they would account for a higher percentage of the variance of SAI, once the near significant predictors were excluded from the analysis. The model was significant ($F(3, 159) = 6.14$, $p < .01$, Adj. $R^2 = .09$) accounting for 9% of the variance. The Beta values for the predictors were $\beta = -.24$ for Neuroticism ($t = -3.08$, $p < .01$), $\beta = .23$ for Openness ($t = 3.05$, $p < .01$) and $\beta = -.15$ for Agreeableness ($t = -1.99$, $p = .05$).

The relationship between SAI and the sub-facets of the NEO-PI-R was also investigated by a series of multiple regressions. Five regressions were performed using in turn the sub-facets of Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness as independent variables and SAI as the dependent variable; and one further regression model was tested, using all the sub-facets simultaneously as predictors. The Beta coefficients for these regressions are presented in Table 2.

The model which used the sub-facets of Extraversion as independent variables was significant ($F(6, 156) = 2.65$, $p = .02$, with Adj. $R^2 = .06$) with significant predictors being gregariousness ($\beta = -.23$, $t = -2.19$, $p = .01$), activity ($\beta = .19$, $t = 2.00$, $p = .05$) and excitement-seeking ($\beta = .22$, $t = 2.39$, $p = .01$). The model which used the sub-facets of Openness was significant ($F(6, 156) = 3.72$, $p = .00$, with Adj. $R^2 = .09$) with ideas being a significant predictor of SAI ($\beta = .36$, $t = 3.66$, $p = .00$). The models which used the sub-facets of Neuroticism, of Agreeableness and of Conscientiousness as independent variables were not significant. The model which used all the sub-facets simultaneously as independent variables, was significant ($F(30, 132) = 1.81$, $p = .01$) accounting for 13% of the variance. Significant predictors were fantasy ($\beta = .25$, $t = 2.39$, $p = .02$) and ideas ($\beta = .24$, $t = 2.25$, $p = .03$).

One further regression model was tested, using only the sub-facets of Neuroticism, Extraversion and Openness as the independent variables, to investigate whether they would account for a higher percentage of the variance of SAI, as these included the only sub-facets that correlated significantly with SAI. The model was significant ($F(18, 144) = 2.70$, $p = .001$), accounting for 16% of

Table 2
Beta coefficients for multiple regressions of Big Five sub-factors on SAI (tested in groups and simultaneously)

	SAI			
	Beta	t	Beta	t
Anxiety	−.22	−1.93	−.25	−1.89
Anger-hostility	.04	.41	−.02	−.18
Depression	.03	.21	.04	.30
Self-conscious	−.05	−.51	−.05	−.42
Impulsiveness	−.01	−.13	.04	.31
Vulnerability	−.02	−.18	−.03	−.21
Regression Model	$F(6,156) = 1.60$			
Adjusted R^2	.02			
Warmth	−.04	−.36	−.12	−.91
Gregariousness	−.23	−2.19*	−.19	−1.73
Assertiveness	.13	1.50	−.05	−.47
Activity	.19	2.02*	.21	1.94
Excitement seek	.22	2.39*	.16	1.51
Positive emotions	−.08	−.84	−.09	−.76
Regression Model	$F(6,156) = 2.65^*$			
Adjusted R^2	.06			
Fantasy	.13	1.44	.25	2.39*
Aesthetics	−.17	−1.76	−.17	−1.65
Feelings	−.11	−1.20	−.08	−.79
Actions	−.06	−.69	−.15	−1.53
Ideas	.36	3.66***	.24	2.25*
Values	.15	1.68	.18	1.95
Regression Model	$F(6,156) = 3.72^{**}$			
Adjusted R^2	.09			
Trust	.01	.07	−.01	−.06
Straightforward	−.14	−1.47	−.12	−1.16
Altruism	.08	.90	.06	.52
Compliance	.04	.45	.05	.42
Modesty	−.14	−1.68	−.11	−1.19
Tender-mind	−.01	−.09	.02	.23
Regression Model	$F(6,156) = 1.03$			
Adjusted R^2	.00			
Competence	.15	1.50	−.09	−.69
Order	−.15	−1.60	−.19	−1.80
Dutifulness	.10	.95	.17	1.46
Achievement−striv	.01	.13	.09	.72
Self discipline	.05	.37	.07	.50
Deliberation	−.09	−.91	−.00	−.03
Regression Model	$F(6,156) = 1.31$		$F(30,132) = 1.81^*$	
Adjusted R^2	.01		.13	

Table 3
Beta coefficients for multiple regressions of SAI and Gf

	SAI			Gf	
	β	t		β	t
SAI				.22	2.75**
Regression model				$F(1,154) = 7.58$**	
R^2				.04	
SAI				.20	2.36*
Neuroticism	−.23	−2.73**		−.02	−.25
Extraversion	−.04	−.46		−.12	−1.35
Openness	.26	3.12**		.19	2.16*
Agreeableness	−.16	−1.98*		.03	.30
Conscientiousness	.06	.75		−.00	−.05
Regression model	$F(5, 157) = 3.83$**			$F(6, 148) = 2.32$*	
R^2	.08			.05	

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

the variance in SAI scores. Significant predictors were activity ($\beta = .24$, $t = 2.55$, $p = .01$), fantasy ($\beta = .20$, $t = 2.11$, $p = .04$), aesthetics, ($\beta = -.20$, $t = -2.03$, $p = .04$) and ideas ($\beta = .27$, $t = 2.68$, $p = .01$). Thus results confirmed that SAI can be significantly predicted by personality traits (H1e).

3.2. Psychometric intelligence

In order to investigate whether SAI, personality, sex and age can predict psychometric intelligence, three hierarchical regressions were performed, with Gf as the dependent variable. The independent variables were SAI for the first model, SAI and the Big Five for the second model, and SAI, the Big Five, sex and age for the third model. The Beta coefficients for these regressions are presented in Table 3.

The first model was significant ($F(1, 154) = 7.58$, $p = .01$, with Adj. $R^2 = .04$). SAI was a significant predictor of Gf, with $\beta = .22$ ($t = 2.75$, $p = .01$). The second model was significant ($F(6, 148) = 2.32$, $p = .04$, with Adj. $R^2 = .05$). Significant predictors of Gf were SAI ($\beta = .20$, $t = 2.36$, $p = .02$) and Openness ($\beta = .19$, $t = 2.16$, $p = .03$). The third model, which added demographics, was not significant ($F(8, 124) = 1.76$, $p = .09$).

4. Discussion

The results of this study showed that three of the Big Five personality traits were modestly but significantly related to SAI. As predicted, these traits were Neuroticism and Agreeableness (both negatively), as well as Openness to Experience (positively). Furthermore, one Extraversion sub-facet, namely activity, was also (positively) significantly related to SAI. Low SAI scores by neurotic and agreeable individuals may be both interpreted in terms of poor self-concept in the former and

humility in terms of the latter (Furnham et al., in press; Wells & Matthews, 1994). This is reflected in two sub-facets of Neuroticism, namely anxiety and vulnerability, and the modesty sub-facet of Agreeableness (although the correlation between SAI and this sub-facet only approached significance levels in the present sample). Conversely, positive relations between SAI and Extraversion can be usually explained in terms of the over-confidence and assertiveness that characterises high Extraversion (Furnham et al., in press). With regard to the relation between SAI and Openness, the positive and significant correlation may be indicative of the conceptual similarities between these two variables. Specifically, it is possible to conceptualise Openness as a type of SAI (specifically a self-estimation of crystallised abilities), although Openness may refer to interests rather than skills (McCrae & Costa, 1997). Further, in the present sample the correlation between Openness and SAI was only moderate (and not larger than the one between Neuroticism and SAI). In that sense, it may only be suggested that Openness is associated with higher estimations of SAI, and vice-versa. To the extent that open individuals tend to score higher on psychometric intelligence tests, particularly those that measure Gc (Ackerman & Heggestad, 1997; Ashton et al., 2000), higher SAI in open individuals could be merely interpreted as a sign of accuracy. That is, since open individuals tend to have higher Gc, one would expect them to give higher SAI.

The present results are therefore consistent with studies indicating that personality is reflected in self-assessed intelligence (Furnham et al., in press, 2001; Furnham, 2001). Furthermore, it may be possible that personality traits such as Neuroticism, Agreeableness and Extraversion distort people's insight into (or at least reports of) their actual intellectual abilities (since Neuroticism, Extraversion and Agreeableness are significantly related to SAI but not to Gf). However research has yet to replicate correlations between personality traits and SAI in order to identify a consistent pattern of personality variables (both super and primary traits) that may best predict SAI.

With respect to the relation between SAI and Gf, we found a modest but significant correlation between these variables. This correlation confirmed our second hypothesis as well as the results of previous studies (Furnham et al., in press, 2001; Furnham & Rawles, 1999; Paulhus et al., 1998; Reilly & Mulhern, 1995). Further, and considering the above discussion, the present findings are consistent with the conceptualisation of SAI as a mediating construct between personality and psychometric intelligence. In that sense, SAI may be influenced by both non-cognitive (e.g., modesty, assertiveness, anxiety, impulsiveness) and cognitive (Gf and Gc) variables.

Regarding the relationship between Gf and personality traits (as considered in our third hypothesis), correlational and regressional analyses showed that only Openness was significantly (albeit modestly) associated with Gf. Although the correlation between psychometric intelligence and Openness was modest, it is slightly larger than expected since the Raven's Matrices measures Gf rather than Gc. Openness and Gf may both underlie the development of Gc and adult intellectual competence, which would explain the significant correlation between the two variables.

There are, of course, some limitations (mainly methodological) in the present study, which make it necessary to be prudent in both our interpretation and generalization of results. Such limitations would certainly include the representativeness of the sample, which was composed of university students (mainly—but not exclusively—of top international universities). These participants can be assumed to be among the highest IQ-test scorers, as well as to have higher SAI and be more likely to invest in intellectual activities. However this would suggest that in a more variable sample, correlations between the three examined constructs (personality, SAI and Gf) may be generally higher (Meehl & Rosen, 1955). Another limitation is perhaps that

SAI was assessed in a general way, without looking at lay conceptions of intelligence or estimation of more specific abilities. In that sense, it may be advisable that future studies looking at the relation between personality, psychometric intelligence and SAI should consider assessing SAI through multiple item inventories/questionnaires. This would provide a more reliable measure of SAI as well as a more specific indicator of the nature and particular lay conceptions of the notions of intelligence underlying SAI. It is however possible that SAI, as assessed in a general way, is likely to be a better indicator of participants' g and, furthermore, capture more aspects of people's self-esteem, self-confidence and self-conception.

Despite these limitations, we believe that the present findings make an important empirical contribution to the current most promising theories of human aptitudes, notably Ackerman (1996) PPKI theory. Specifically, our results are consistent with the conception of Openness as both a relevant factor in the acquisition of skills and a self-report measure of assessed intellect (Goff & Ackerman, 1992). It is interesting that this personality trait was correlated with psychometric intelligence, although we employed a measure of fluid (and strictly non-verbal) intelligence. Indeed, Ashton et al. (2000) argued that "Openness is oblique to the ability to process abstract, spatial or quantitative nature" (p. 203). However, if we consider Raven's own definition of Gf, i.e., "making meaning out of confusion; developing new insights; going beyond the given to perceive that which is not immediately obvious" (Raven et al., 1998, p. 64) it is not surprising that Openness correlated with this construct. Moreover, it is likely that objective competencies (e.g., high Gf) support intellectual interests such as those represented by the Openness trait (Matthews, Davies, Westerman, & Stammers, 2000). Already Cattell (1971) had suggested that Gf is a pre-condition for knowledge acquisition and application.

Finally, this study strongly supports the conception of SAI as a mediating concept between personality and intelligence (Eysenck & Eysenck, 1985; Stankov, 1999). Furthermore, although it is methodologically appropriate to conceptualize SAI within the personality domain, it is likely that SAI is affected by both personality and intelligence. Given the current interest on understanding the personality-intelligence interface, we support the idea that SAI appears to be a fruitful concept for the development of novel, more integrated theories of individual differences. It is perhaps time that psychology's emphasis on psychometric intelligence takes into account people's conceptions and self-estimations, since SAI may affect IQ test performance. The belief that we are born with unchangeable intellectual aptitudes—see Sternberg (1996) discussion on intellectual disengagement—may have more detrimental consequences than low intelligence itself and, as Holland (1973) has argued, interests may be more determined by self-estimated than "actual" intelligence.

References

Ackerman, P. L. (1996). A theory of adult intellectual development: Process, personality, interests, and knowledge. *Intelligence, 22*, 227–257.

Ackerman, P. L., & Goff, M. (1994). Typical intellectual engagement and personality: Reply to Rocklin. *Journal of Educational Psychology, 86*, 150–153.

Ackerman, P. L., & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin, 121*, 219–245.

Anastasi, A. (1998). *Psychological testing* (4th ed.). New York: Macmillan.

Ashton, M. C., Lee, K., Vernon, P. A., & Jang, K. L. (2000). Fluid intelligence, crystallized intelligence, and the Openness/Intellect factor. *Journal of Research in Personality, 34*, 198–207.

Brand, C. (1994). Open to experience-closed to intelligence: Why the Big Five are really the Comprehensive Six. *European Journal of Personality, 8*, 299–310.

Brebner, J., & Stough, C. (1995). Theoretical and empirical relationships between personality and intelligence. In D. Saklofske & M. Zeidner (Eds.), *International handbook of personality and intelligence. Perspectives on individual differences* (pp. 321–347). New York, NY, USA: Plenum Press.

Cattell, R. B. (1941). The measurement of adult intelligence. *Psychological-Bulletin, 40*, 153–193.

Cattell, R. B. (1971). *Abilities: their structure, growth, and action*. Boston: Houghton Mifflin, 583 pp.

Cattell, R. B. (1987). Intelligence: Its structure, growth and action. Advances in psychology, No. 35, Cattell Inst, HI, USA.

Chamorro-Premuzic, T., & Furnham, A. (2003a). Personality predicts academic performance: Evidence from two longitudinal university samples. *Journal of Research in Personality, 37*, 319–338.

Chamorro-Premuzic, T., & Furnham, A. (2003b). Personality traits and academic exam performance. *European Journal of Personality, 17*, 237–250.

Costa, P. T., Jr., & McCrae, R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-factor Inventory (NEO-FFI): Professional Manual*. Odessa, FL: Psychological Assessment Resources, Inc.

Cronbach, L. J. (1949). *Essentials of Psychological Testing*. New York: Halpern.

Eysenck, H. (1971). Relationship between intelligence and personality. *Perceptual and Motor Skills, 32*, 637–638.

Eysenck, H. (1994). Personality and intelligence: Psychometric and experimental approaches. In R. Sternberg & P. Ruzgis (Eds.), *Personality and intelligence* (pp. 3–31). New York, NY, USA: Cambridge University Press.

Eysenck, H., & Eysenck, M. (1985). *Personality and individual differences*. New York: Plenum.

Eysenck, M. W. (1982). *Attention and arousal: cognition and performance*. New York: Springer.

Furnham, A. (2001). Self-estimates of intelligence: Culture and gender difference in self and other estimates of both general (g) and multiple intelligences. *Personality and Individual Differences, 31*, 1381–1405.

Furnham, A., Chamorro-Premuzic, T., & Moutafi, J. (in press). Personality and intelligence: Gender, the Big Five, self-estimated and psychometric intelligence. *International Journal of Selection and Assessment*.

Furnham, A., Forde, L., & Cotter, T. (1998a). Personality and intelligence. *Personality and Individual Differences, 24*, 187–192.

Furnham, A., Forde, L., & Cotter, T. (1998b). Personality scores and test taking style. *Personality and Individual Differences, 24*, 19–23.

Furnham, A., Kidwai, A., & Thomas, C. (2001). Personality, psychometric intelligence and self-estimated intelligence. *Journal of Social Behaviour and Personality, 16*, 97–114.

Furnham, A., & Rawles, R. (1999). Correlations between self-estimated and psychometrically measured IQ. *Journal of Social Psychology, 139*, 405–410.

Goff, M., & Ackerman, P. L. (1992). Personality-intelligence relations: Assessment of typical intellectual engagement. *Journal of Educational Psychology, 84*, 537–553.

Goldberg, L. R. (1994). Resolving a scientific embarrassment: A comment on the articles in this special issue. *European Journal of Personality, 8*, 351–356.

Hofstee, W. K. B. (2001). Personality and Intelligence: Do they mix? In J. M. Collis & S. Messick(Eds.), *Intelligence and personality: Bridging the gap in theory and measurement*. (pp. 43–60). England: Plymouth.

Holland, J. L. (1973). Some practical remedies for providing vocational guidance for everyone. Johns Hopkins U. Ctr for Soc. Org. of Sch., 29 pp.

Humphreys, M. S., & Revelle, W. (1984). Personality, motivation and performance: A theory of the relationship between individual differences and information processing. *Psychological Review, 91*, 153–184.

Johnson, J. A. (1994). Clarification of factor five with the help of the AB5C model. *European Journal of Personality, 8*, 311–314.

Matthews, G., Davies, D. R., Westerman, S. J., & Stammers, R. B. (2000). *Human performance. Cognition, stress, and individual differences*. UK: Psychology Press.

McCrae, R., & Costa P. T. (1997). Conceptions and correlates of openness to experience. In Hogan, R., & Johnson, J. A., et al. (Eds.), Handbook of personality psychology (pp. 825–847). Tulsa, OK, USA.

Meehl & Rosen (1955). Antecedent probability and the efficiency of psychometric signs, patterns, or cutting scores. *Psychological Bulletin, 52*, 194–216.

Paulhus, D., Lysy, D., & Yik, M. (1998). Self-report measures of intelligence: Are they useful as proxy IQ tests? *Journal of Personality, 66*, 523–555.

Petrides, K., Chamorro-Premuzic, T., Fredrickson, N., & Furnham, A. (in press). Personality and psychometric intell igence as predictors of academic performance in school. *British Journal of Educational Psychology*.

Raven, J., Raven, J. C., & Court, J. H. (1998). *Les ''Advanced Progressive Matrices'': Edition 1998*. Paris: Editions et Applications Psychologiques. (Oxford: Oxford Psychologists Press).

Reilly, J., & Mulhern, G. (1995). Gender differences in self-estimated IQ: The need for care in interpreting group data. *Personality and Individual Differences, 18*, 189–192.

Rawlings, D., & Carnie, D. (1989). The interaction of EPQ extraversion and WAIS subtest performance under timed and untimed conditions. *Personality and Individual Differences, 10*, 453–458.

Robinson, D. (1985). How personality relates to intelligence test performance: Implications for a theory of intelligence, aging research, and personality assessment. *Personality and Individual Differences, 6*, 203–216.

Saucier, G. (1994). Trapnell versus the lexical factor: More ado about nothing? *European Journal of Personality, 8*, 291–298.

Spearman, C. (1927). *The abilities of man*. New York: Macmillan.

Stankov, L. (1999). Mining on the no man's land between intelligence and personality. In P. L. Ackerman & P. C. Kyllonen et al. (Eds.), *Learning and individual differences: Process, trait, and content determinants* (pp. 315–337). Atlanta, GA, USA: Georgia Institute of Technology.

Sternberg, R. (1996). *Beyond the classroom: Why school reform has failed and what parents need to do*. New York: Simon & Shuster.

Webb, E. (1915). *Character and Intelligence*.

Wechsler, D. (1950). Cognitive, conative, and non-intellective intelligence. *American Psychologist, 5*, 78–83.

Wells, A., & Matthews, G. (1994). *Attention and emotion: A clinical perspective*. Hove, UK: Lawrence Erlbaum Associates Ltd.

Whipple, G. M. (1922). *The national intelligence tests*. Bloomington, IL: The Public School Publ. Co., 16–31 pp.

Wine, J. D. (1982). Evaluation anxiety: A cognitive-attentional construct. In H. W. Krohne & L. Laux (Eds.), *Achievement, stress and anxiety*. Washington, DC: Hemisphere.

Zeidner, M., & Matthews, G. (2000). Intelligence and personality. In R. Sternberg (Ed.), *Handbook of intelligence* (pp. 581–610). New York, NY, USA: Cambridge University Press.