This study looks at the relationship between personality traits (Big Five personality traits), fluid (Gf) and subjectively-assessed (SAI) intelligence. British university students together \( (N = 100) \) completed the NEO-PI-R (Costa & McCrae, 1992), five intelligence tests, a measure of Emotional Intelligence (EQ) and estimated their intellectual ability on a normal distribution followed by six specific abilities. The Wonderlic Personnel Test score was a significant predictor of three estimates: EQ of two; and Openness to Experience of five of these estimates. The most variance accounted for was 16 per cent when regressing intelligence the Big Five personality traits and emotional intelligence onto SAI scores. The five intelligence tests correlated significantly with each other. Males give higher overall IQ self-estimates (114.4 vs 106.4) and higher overall vocabulary scores (116.0 vs 106.5). Regressing the six specific abilities onto the overall estimate showed three to be significant (Vocabulary, Ability to learn new things, Cultural Knowledge).

Key words: Openness, Big Five traits, subjectively-assessed and psychometric intelligence

The question of whether and how personality and intelligence are related is not new (Cattell, 1941; Spearman, 1927; Wechsler, 1950; Whipple, 1922). Both constructs have been traditionally investigated independently, prompting the development of different methods and theories (Ackerman & Heggestad, 1997; Cronbach, 1949; Hofstee, 2001; Zeidner & Matthews, 2000). Personality variables have been considered, along 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, 2005).

Whereas general intellectual ability appears to be theoretically unrelated to non-cognitive traits (Brebnor & Stough, 1995; Eysenck, 1994; Zeidner & Matthews, 2000), certain personality traits have been shown consistently to relate to test performance. Thus, it is not surprising that some traits are logically, significantly, but negatively correlated with intelligence. Meta-analytical studies have shown that personality traits are, at best, only modestly related to general intelligence (Ackerman & Heggestad, 1997). Neuroticism (trait anxiety), affects performance negatively on examinations (Eysenck, 1982; Humphreys & Revelle, 1984; Wells & Matthews, 1994; Wine, 1982). Extraversion/Introversion has been found to relate to different test-taking styles (Eysenck, 1971; Furnham, Forde, & Cotter, 1998a, 1998b; Robinson, 1985). Openness to Experience is consistently shown to
be moderately and significantly correlated with intelligence, particularly with its crystallized aspects (Gc) \( (r = .30 \text{ in Ackerman & Heggestad, 1997}) \). Openness appears to be conceptually directly related to intelligence, rather than merely affect test performance (psychometric intelligence) because it is associated with curiosity, imagination, and a desire to understand. Some researchers have preferred to refer to Openness as Intellect or Culture, interpreting this personality trait in terms of introspective reflection and intellectual knowledge (see Saucier, 1994). Openness is therefore associated with intellectual curiosity, vivid imagination, and behavioural flexibility (McCrae, 1993; McCrae & Costa, 1997), but also with understanding, ability, knowledge of science, change and autonomy (see Ashton, Lee, Vernon, & Jang, 2000).

On the other hand, the fact that (like other personality traits) Openness is assessed through typical, rather than maximal, performance, suggests that this personality trait could be related to other variables (e.g., interests, creativity) 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 who also developed a measure of Typical Intellectual Engagement (TIE).

Over the last decade many papers have also examined the relationship between personality inventories (notably the NEO-PI-R) and single self-estimates or indicators of subjectively-assessed, self-estimated intelligence (SEI) (Furnham, 2001; Furnham, Chamorro-Premuzic, & Moutafi, 2005; Furnham, Kidwai, & Thomas, 2001). One reason for doing this research was to determine whether self-assessment could act as a useful proxy for actual IQ tests (Paulhus, Lysy, & Yik, 1998). Studies have found that self-estimated and self-assessed scores correlate around \( r = .30 \) with validated psychometric test scores. However in a recent study Chamorro-Premuzic, Furnham, and Moutafi (2004) found correlations of between \( r = .39 \) and \( r = .49 \) with test scores. It seems that if participants make estimates on how they have done on particular test correlations increase, but never exceed \( r = .50 \).

Self Assessment is usually obtained by asking participants to rate or estimate their intellectual ability on an appropriately labeled bell curve (Furnham, 2001). Significant correlations were found between SEI and Neuroticism (negative), Agreeableness (negative), and Openness to Experience (positive). Furthermore, regresional analyses indicated that SEI 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, Chamorro-Premuzic, & Moutafi, 2005; Furnham, Kidwai, & Thomas, 2001). SEI may therefore be important (both conceptually and psychometrically) with regard to understanding the personality-intelligence interface (Chamorro-Premuzic & Furnham, 2004). Personality variables seem more closely related to SEI than actual psychometric test scores. However, SEI may be important as self-theories of intellectual ability have been shown to relate to motivation to learn in educational settings (Dweck, 2000). Thus it seems to understand the role of personality and intelligence as predictor variables of academic success we also need to take into consideration self-assessed abilities. Various previous studies have demonstrated a consistent cross-national sex
difference in SEI with males always giving higher estimates than females (Furnham, 2001).

Eysenck’s (Eysenck & Eysenck, 1985) conceptualization of SEI was defined as being influenced by actual intelligence as well as personality traits. Likewise, Stankov (1998a, 1998b, 1999) has argued that self-confidence, self-monitoring and self-evaluation are “borderline concepts” between personality and intelligence. However, both Eysenck and Stankov included SEI within personality domain. This is consistent with the fact that Openness to Experience and TIE can be conceptualized (and measured) as personality correlates of psychometric intelligence. In any case, SEI (like creativity, motivation, curiosity and self-efficacy) seems to be affected by an array of both cognitive and non-cognitive variables (Zeidner, 1995).

The present study will examine the extent to which five psychometric test results measuring intelligence, personality and emotional intelligence predicts six ratings of SEI. It is novel in two respects. Firstly, in the study the results of five quite different but all psychometrically assessed IQ test results on each individual will be available. Secondly, participants make ratings not only of SEI but five other related concepts described in lay language.

H$_1$ : There will be a sex difference in self-estimated overall intelligence (Furnham, 2000).
H$_2$ : SEI will be also expected to correlate with psychometric intelligence (Gf). This would confirm previous findings (Furnham, Chamorro-Premuzic, & Moutafi, 2005; Furnham, Kidwai, & Thomas, 2001; Furnham & Rawles, 1999; Paulhus, Lysy, & Yik, 1998; Reilly & Mulhern, 1995).
H$_3$: Overall SEI will be correlated with, and predicted by, Neuroticism (negatively), Extraversion (positively), Agreeableness (negatively), and Openness to Experience (positively).

**METHOD**

**Participants:***
A total of 100 undergraduate students from British universities participated in this study. Of these, 31 were male and 69 were female. Their age ranged from 18 to 21, with a mean of 18.17, and a standard deviation of 2.46, 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).

**Measures:**

**Personality:** *The NEO Personality Inventory — Revised* (NEO-PI-R; Costa & McCrae, 1992). This 60-item, non-timed questionnaire, measures the “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.

**Emotional Intelligence:** *Trait Emotional Intelligence Questionnaire* (TEIQue, Petrides & Furnham, 2001). This questionnaire compromises 144 items designed to cover the sampling domain of trait emotional intelligence (EI) comprehensively. Participants respond on a 7-point scale ranging from “completely disagree” to “completely agree”. The inventory provides scores on 15 different subscales as well as global trait EI score.

**Intelligence:** A) *The Wonderlic Personnel Test* (Wonderlic, 1992). This 50-item test can be
administered in 12 minutes and measure general intelligence. Scores can range from 0 to 50. Items include word and number comparisons, disarranged sentences, serial analysis of geometric figures and story problems that require mathematical and logical solutions. The test has impressive norms and correlates very highly \( r = .92 \) with the WAIS-R. B) \textit{The Baddeley Reasoning Test} (Baddeley, 1968). This 60-item test can be administered in 3 minutes and measures Gf through logical reasoning. Scores can range from 0–60. Each item is presented in the form of a grammatical transformation that has to be answered with “true”/“false”, e.g. “A precedes B — AB” (true) “A does not follow B — BA” (false). The test has been employed previously in several studies (e.g., Furnham, Gunter & Peterson, 1994;) to obtain a quick and reliable indicator of people’s intellectual ability. C) \textit{S & M Test of Mental Rotation Ability} (Philips & Rawles, 1976). This is a quick measure of mental rotation based upon Shepherd and Metzler’s (1971) visual-spatial ability test. The S & M test is a timed mental rotation test and can be administered in 2 minutes. D) \textit{AH5 (Part 1)} (Heim, 1968). This is a well-established measure of verbal and spatial ability. It was designed to be used with selected, highly intelligent students. There are alternative tests (Part 1 and Part 2). The test is 20 minutes long and has good British norms. E) \textit{Vocabulary} (Wechsler, 1981). The vocabulary scale only from the WAIS was used.

\textit{Self-Estimated Intelligence}: Participants were shown a normal distribution with 3 standard deviations above and below the norm with explanations and descriptions (i.e., 70 borderline retardation, 130 superior). They were then invited to estimate their overall IQ as well as 1. Their ability to reason, 2. Their general knowledge, 3. Their ability to learn new things, 4. Their vocabulary and use of language, 5. Their ability to understand difficult concepts, 6. Their knowledge of cultural issues.

\textit{Procedure}:

The participants were tested in the first term. The four intelligence tests were completed under conditions but the personality, EI and Self-Estimates questionnaires were completed in their own time and handed in later. There was a 98% response rate.

\textbf{RESULTS}

Table 1 shows the correlations between the measures of personality and intelligence. Three things are worth noting. First, with one exception, the ten inter-correlations between the different measures of intelligence were positive and significant. Second, correlation between “academic” and emotional intelligence were low, mostly negative and non-significant. Third, four of the five personality variables were correlated with emotional intelligence. They showed that open, stable, conscientious, extraverts had higher emotional intelligence scores. This is in accordance with previous studies (Petrides & Furnham, 2001).

The seven self-estimates were also intercorrelated. All were positive but modestly so in the range \( .20 < r < .30 \).

The intelligence tests measures were combined to form an overall measure of general intelligence (g). This was correlated with EI and the five personality traits. Only one was significant: conscientiousness correlated \( r = -.26 \) \( (p < .05) \) with g.

Table 2 shows two analyses. First, it shows the results of an analysis of variance between males and females on the self-estimate on the seven facets. Males gave higher overall and vocabulary scores than females. This confirmed \( H_1 \).

The table also shows results of the regression which indicate that three of the specific estimates were significant predictors of the overall intelligence. The results showed that self-estimates of vocabulary, the ability to learn new things and general knowledge were the best prediction of the overall self-estimated intelligence. Indeed, two-thirds of the
variance could be explained by this regression. A factor analysis of the six specific estimates indicated that all loaded on the same factor.

Table 3 shows the results of seven regressions where the five IQ test scores, EQ and
In this analysis first the five IQ Scale scores were regressed onto the estimated score. This confirms H$_2$ but not H$_3$. This was only significant for the overall self-estimated intelligence score and indicated that brighter people (who scored highly on the Wonderlic) gave higher self-estimates. None of the other six regressions were significant.

Where the five intelligence test scores were predictor variables and the specific self-estimates (i.e., “the ability to reason”) the criteria (see Table 3, Model 1). The next set of regressions added the emotional intelligence score. Here three were significant: overall intelligence, the learning of new things and the learning of difficult concepts. In each case higher emotional intelligence score was associated with higher self-estimates. The final set of regression looked at the results for regressing personality, EQ and intelligence onto the estimates. Again three were significant: Openness to experience seemed the personality variable most consistency and logically related to self-estimated intelligence.

Table 3 shows the results when all 11 variables were regressed onto each self-estimated criterion.

<table>
<thead>
<tr>
<th>Overall IQ</th>
<th>Reasoning</th>
<th>General knowledge</th>
<th>Learning new</th>
<th>Vocabulary</th>
<th>Concepts understanding</th>
<th>Cultural knowledge</th>
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<tbody>
<tr>
<td>Beta</td>
<td>t</td>
<td>Beta</td>
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<td>Beta</td>
<td>t</td>
<td>Beta</td>
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<tr>
<td>Wonderlic</td>
<td>.36</td>
<td>3.04**</td>
<td>.27</td>
<td>2.18*</td>
<td>.17</td>
<td>1.34</td>
</tr>
<tr>
<td>Baddeley</td>
<td>.14</td>
<td>1.22</td>
<td>-.01</td>
<td>.16</td>
<td>.07</td>
<td>.55</td>
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<tr>
<td>Spatial</td>
<td>.00</td>
<td>.02</td>
<td>.05</td>
<td>.45</td>
<td>.04</td>
<td>.36</td>
</tr>
<tr>
<td>AHS</td>
<td>-.05</td>
<td>.36</td>
<td>-.14</td>
<td>1.00</td>
<td>-.10</td>
<td>.69</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>-.06</td>
<td>.61</td>
<td>.09</td>
<td>.79</td>
<td>.01</td>
<td>.08</td>
</tr>
<tr>
<td>TOT EI</td>
<td>.30</td>
<td>2.70**</td>
<td>.19</td>
<td>1.63</td>
<td>.04</td>
<td>.34</td>
</tr>
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</table>

| Neuroticism  | .02     | .18         | -.03       | .22       | .05                      | .45            | .06               | .54             | .06            | .25            | .01               | .10             | .01               | .10              |
| Extraversion | .01     | .13         | -.14       | 1.37      | .08                      | .75            | .00               | .00             | .00            | .69            | -.09              | .10             | .06               | .54              |
| Openness to experience | .12 | 1.17 | .23                  | 2.22* | .28                      | 2.69**         | .15               | 1.43           | .25            | 2.33*         | .22               | 2.16*            | .34               | 3.26***           |
| Agreeableness| -.12   | 1.26        | -.09       | .93       | -.16                     | 1.60           | -.15              | 1.44           | .07            | .75            | -.19              | 1.98             | -.28              | 2.25             |
| Conscientiousness | .10 | .98        | .09                   | .85      | -.10                     | .96            | .05               | .50             | .00            | .04            | .06               | .60             | .03               | .25              |

Model 1 | $F$ | Adj$R^2$ | $F$ | Adj$R^2$ | $F$ | Adj$R^2$ | $F$ | Adj$R^2$ | $F$ | Adj$R^2$ | $F$ | Adj$R^2$ | $F$ | Adj$R^2$ | $F$ | Adj$R^2$ |
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</tr>
</thead>
<tbody>
<tr>
<td>1 (5, 119)</td>
<td>2.47*</td>
<td>.06</td>
<td>1.91</td>
<td>.04</td>
<td>1.14</td>
<td>.05</td>
<td>2.16</td>
<td>.04</td>
<td>1.34</td>
<td>.01</td>
<td>2.15</td>
<td>.05</td>
<td>0.64</td>
<td>.01</td>
<td>2.35</td>
<td></td>
</tr>
<tr>
<td>2 (6, 113)</td>
<td>4.75**</td>
<td>.16</td>
<td>1.99</td>
<td>.10</td>
<td>0.94</td>
<td>.05</td>
<td>2.47*</td>
<td>.07</td>
<td>1.68</td>
<td>.03</td>
<td>3.50**</td>
<td>.11</td>
<td>0.98</td>
<td>.01</td>
<td>3.09</td>
<td></td>
</tr>
<tr>
<td>3 (11, 108)</td>
<td>2.91**</td>
<td>.15</td>
<td>1.87*</td>
<td>.16</td>
<td>1.56</td>
<td>.14</td>
<td>1.76</td>
<td>.07</td>
<td>1.59</td>
<td>.05</td>
<td>2.90*</td>
<td>.15</td>
<td>1.87*</td>
<td>.07</td>
<td>3.30</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Model 1 represented the results when just the five psychometric IQ scores were regressed onto the total; Model 2 was with the five IQ tests plus EQ; Model 3 was with the 5 IQ tests, EQ, plus the five personality traits. Degrees of freedom are in parenthesis.

*p < .05. **p < .01. ***p < .001.
Table 4 shows the results of the regression for the totalled self-estimated intelligence (SEI). This totalled the six specific estimates not including the overall estimate. The regression was significant \((F(11, 82) = 3.21, p < .01, R^2 = .28)\). The results indicated that “bright” people with high EQ and Openness scores tended to give higher self-estimates.

**DISCUSSION**

This study is one of a series on self-estimated intelligence (Chamorro-Premuzic & Furnham, 2004). Many studies have investigated sex differences in self-estimated overall intelligence and have shown almost unequivocal findings supporting the male hubris; female humility effect. This study gave the same result with males providing an estimate of about 8 IQ points (almost exactly 0.5 of a standard deviation) above females.

Other studies have looked, in addition to self-estimated overall IQ, self-estimates on Gardner’s multiple intelligences (Furnham, 2000; Furnham et al., 2002); Sternberg’s multiple intelligences (Furnham & Petrides, 2004); the subscales of the WISC (Furnham & Crawshaw, 2002); the WAIS (Furnham, Crawshaw, & Rawles, 2005); Cattell’s second order factors (Furnham, 2004); and the Stanford Binet (Furnham, Crawshaw, & Rawles, 2004). This study looked at estimates of six facets of intelligence all expressed in lay language, that is, how ordinary people talk about intelligence. Furnham (2001) reviewing the literature on lay definitions of intelligence showed that lay people define intelligence more widely than experts often arguing that general knowledge or the ability to reason is at the heart of intelligence.
As in previous studies this study looked at sex differences in self-rated intelligence. Males rated themselves significantly higher than females on one of the six ratings. Rather surprisingly males rated their vocabulary higher than females by around 9 IQ points. Both self-rating studies and studies looking at actual psychometric test score differences suggest little sex difference with respect to vocabulary. Where differences exist it is more likely to be in spatial and/or mathematical tasks (Furnham, 2001).

Males did not believe they had greater “knowledge about cultural issues” which may be taken as a measure of crystallized knowledge. Indeed there is recent evidence that on tasks of general knowledge males do indeed out perform females (Irwing, Cammock, & Lynn, 2001). Indeed the rating difference (over 5 IQ points) on ratings of general knowledge approached, but did not reach significance level. Compared to other studies in this area the results were similar: a significant sex difference on the overall rating but far fewer when referencing specific skills/abilities which of the six ratings tapped most overall or general intelligence. A regression was run to answer this question and results showed three ratings significant: vocabulary, cultural knowledge and the ability to learn new things. This covers both fluid and crystallized intelligence.

However, perhaps the most interesting and unique part of this study lay in the results shown in Table 3. The central question was to what extent intelligence, emotional intelligence and personality differences predicted self-rated intelligence. The rating of overall intelligence showed that one intelligence test score (the Wonderlic) and a measure of trait emotional intelligence predicted overall self-ratings and that this accounted for 16 per cent of the variance. Bright, emotionally intelligent, participants awarded themselves higher scores. The personality variables were not significant and contributed no additional variance.

Self-ratings on the ability to reason were predicted by the Wonderlic scale and one personality variable Openness to experience. The three blocks of independent variables alone or together were unable to significantly predict ratings of general knowledge or vocabulary. Two intelligence tests; one crystallized (Wonderlic) and the other of fluid intelligence (Baddeley) were able to predict self rated ability to learn new things though they accounted for only 7% of the variance.

Trait emotional intelligence and Openness to experience were the only significant predictors of the ability to understand difficult concepts. These two factors accounted for 15% of the variance. Finally Openness to experience was the only significant predictor of cultural knowledge.

The results of the seven regressions shown in Table 3 show five things. First, neither actual cognitive ability, emotional intelligence, nor personality are strong predictors of self-rated intelligence which has been shown before (Furnham & Thomas, 2004). Second, while the results are not strong they are consistent with actual findings where significant intelligence test scores (3 out of 7 with the Wonderlic; 1 out of 7 with the Baddeley) do predict self-rated intelligence. It should be noted that participants made these ratings without knowing either their scores or population norms. It is perhaps surprising that these results were not stronger, but may result from test inexperience and the feedback.

Third, it is interesting to note that Trait Emotional Intelligence predicted two ratings.
Many lay people believe emotional intelligence an inherent component of actual, academic intelligence. However, there remains considerable debate on this issue (Petrides & Furnham, 2001).

Overall the personality trait factors had an influence on scores. However one factor, Openness to Experience, was a significant predictor on 5 of the 7 ratings. This indeed makes sense as it has been argued that Openness is indeed a surrogate measure of intelligence.

This study has shown that personality and intelligence are indeed related but that results differ according to which test is used. In this study Conscientiousness was negatively correlated with four of the five intelligence tests, two significantly. It also demonstrated that while Emotional Intelligence was only modestly and negatively correlated with cognitive ability (intelligence) test scores it was significantly correlated with four out of five personality traits. Finally the study showed that intelligence, and emotional intelligence, and personality are consistently and coherently related to self-estimated intelligence. Specifically bright/smart (as measured by the Wonderlic and to a lesser extent the Baddeley scale), Emotionally Intelligent, Open-to-Experience individuals estimate their general intelligence highest.

REFERENCES


(Manuscript received April 27, 2004; Revision accepted July 12, 2005)