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High potential personality and intelligence

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ABSTRACT

The present study investigated the relationship between six high flyer personality traits and intelligence measured at the domain and facet level. In all, 820 adults completed a multidimensional High Flyers Personality Inventory (measuring six traits) and a multidimensional intelligence test. Correlational analysis showed four traits were related to specific measures of IQ; particularly Conscientiousness, Risk Approach, Ambiguity Acceptance, and Competitiveness. Regressions showed the five IQ measures were differently related to the six high flyer traits, accounting for between three and 7% of the variance. Additionally, structural equation models (SEM) demonstrated that these relationships differ between male and female participants. Results are discussed in terms of the literature on the relationship between preference (personality) and power (ability) tests. Limitations are acknowledged.

1. Introduction

There have been many recent studies on the relationship between personality and intelligence (Ackerman & Heggestad, 1997; Austin et al., 2002; Furnham, Forde, & Cotter, 1998; Goff & Ackerman, 1992; Moutafi, Furnham, & Crump, 2003). Most have focused on measures of intelligence in relation to the personality factors of the Five Factor Model (FFM). This study focuses on six High Potenital Traits: Conscientiousness, Adjustment, Curiosity, Risk Approach, Ambiguity Acceptance, and Competitiveness (MacRae, 2012).

Cognitive ability refers to what a person can achieve in workplace and educational settings, personality variables determine whether and *how* and *why* they do or do not realize potential. Cattell (1971) suggested that certain elements of personality will have an intellectual ability component, which will affect general ability. Indeed, Cattell has an investment model which suggests that personality traits (like Conscientiousness and Openness) may have long-term effects on the development of intellectual abilities. Thus, personality factors may be seen as motivational variables that have a strong impact on academic results.

The major replicated findings on the relationship between intelligence and the Big 5 factors of personality are that intelligence is positively correlated with Openness to Experience (Ackerman & Heggestad, 1997; Chamorro-Premuzic, Furnham, & Moutafi, 2004; Moutafi, Furnham, & Paltiel, 2004), negatively correlated with Neuroticism (Ackerman & Heggestad, 1997) and Conscientiousness (Demetriou, Kyriakides, & Avraamidou, 2003; Moutafi et al., 2004) and correlated with Extraversion (Ackerman & Heggestad, 1997; Austin et al., 2002; Furnham et al., 1998; Lynn, Hampson & Magee, 1984; Moutafi et al., 2003; Moutafi et al., 2004), the sign of the correlation depending on the testing conditions (e.g. negative correlations are noted when intelligence tests emphasised obtaining the correct answer [Moutafi et al., 2003], compared to positive correlations when intelligence was assessed in terms of speed of processing [Furnham et al., 1998]).

O'Connor and Paunonen (2007) concluded that Conscientiousness was the trait most strongly and consistently associated with academic performance (AP) while Openness was sometimes but not always positively associated with scholastic achievement. Overall, the results suggest that Extraversion is negatively correlated with AP at university, but positively correlated with AP in primary school. Neuroticism is usually slightly negatively correlated with AP because anxiety negatively impacts on test performance, while Agreeableness seems unrelated to AP·The results suggest that where the relationship between personality traits and intelligence was significant, correlations were very modest.

There are a number of studies on the role of personality and intelligence in workplace performance and success. In a review of the personality literature Furnham (2018) concluded that two traits relate most to success: low Neuroticism and high Conscientiousness. Neurotics are prone to stress, illness and often poor decision making; while Conscientious people are well organised, planful and hardworking. For the other three traits much depends on the nature of the job. In some jobs Agreeableness is probably positively correlated with work success

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(counselling) whereas in others it is negatively correlated (negotiations). The same is true of Extraversion which is usually correlated with work success because of the optimism and social skills associated with extraversion though it is obvious that in some jobs (pilot, air traffic control) it may be Introversion which is a best predictor.

2. High flyer traits

Based on Silzer and Church's (2009a, 2009b) theoretical framework of potential, MacRae and Furnham (2014) have developed the High Potential Traits Inventory (formerly High Flying Personality Inventory), a measure of personality traits directly relevant to workplace behaviours, thoughts and perceptions of the self and others at work. The HPTI can be used to investigate which personality traits in the workplace might predict career success and thus predict high potential The High Potential Traits Inventory (MacRae, 2012; MacRae & Furnham, 2014) was designed to provide an accurate, valid and clear measure of personality at work. Originally composed of ten factors and characteristics related to success and leadership capability, the traits were recombined into six common factors (MacRae, 2012), which are most relevant for the workplace using Factor Analysis and Structural Equation Modelling. The HPTI factors used to assess potential at work are Conscientiousness, Adjustment, Curiosity, Ambiguity Acceptance, Risk Approach, and Competitiveness.

Teodorescu, Furnham, and Macrae (2017) used the HPTI to investigate associations between personality traits and measures of career success, in a sample of 383 employed individuals. The HPTI traits related to subjective and objective measures of success with Conscientiousness being the strongest predictor. These results are consistent with previous research on High Flyers.

Based on the Big Five and the High Flyer studies there is good reason to believe that there would be a significant positive relationship between all traits, particularly Conscientiousness and Curiosity and IQ.

3. Intelligence

There are many passionate debates around the definition and measurement of IQ (Deary, 2012; Flynn, 2014; Hunt & Jaeggi, 2013; Johnson, 2013). There are also a number of tests available. Most people who work in the area accept the concept of general intelligence ("g") and accept that all well designed intelligence tests correlate highly with each other (Deary, 2000, 2001, 2012). They also accept that it is possible to measure different facets of intelligence (Level 1) abilities which while they correlate with each other are differentially related to other variables (Carroll, 1997). The current study aims to address the areas and extent to which cognitive ability and speed of processing contribute to an individual's level of potential in the workplace.

4. Method

4.1. Participants

There were 820 participants in total, composed of 377 females and 443 males. The participant sample were all from the United Kingdom, where participants were assessed by a UK psychometrics consultancy as a part of recruitment or selection and development.

4.1.1. Measures HPTI Measure

The HPTI is designed to measure personality traits in a workplace-context (MacRae, 2012; MacRae & Furnham, 2014). There are 6 factors including conscientiousness, adjustment, curiosity, ambiguity acceptance, risk approach and competitiveness. These six factors are measured with a 78-item questionnaire. Scores for each factor are z-scores that are based upon the means and standard deviations of an original norm sample.

4.1.2. General intelligence assessment (GIA)

The GIA is a cognitive ability assessment used to measure speed, accuracy and cognitive processes across five domains. The GIA represents a computer-based cognitive ability assessment that was derived from a battery of tests (see Collis, Tapsfield, Irvine, Dann, & Wright, 1995; Irvine & Dann, 1994). The GIA utilises computer-based item-generation: tests are constructed in "real time" by rules supplied to the testing system, allowing the automatic production of an extremely large number of different yet equivalent forms of the same test (Irvine, Dann, & Anderson, 1990).

Drawing on Detterman's (1986) observation that intelligence is a 'complex system…of a finite number of independent (i.e. orthogonal) variables", the GIA consists of five tests:

The *Reasoning Test* assesses the ability to make inferences, to reason from information provided and to draw correct conclusions. This test assesses the ability of an individual to hold information in their short-term memory and solve problems after receiving written instructions. Participants are presented with a simple statement containing two agents and a comparison: e.g. "X is bigger than Y." This statement disappears after the user clicks, where they are presented with a question relating to the previous statement and must select the correct answer from two options: 'Who is taller? X or Y'. A high score would suggest fluent verbal reasoning skills.

The *Perceptual Speed Test* assesses the capacity to recognise details in the environment, incorporating the perception of inaccuracies in written material, numbers and diagrams, the ability to ignore irrelevant information, to identify similarities and differences in visual configurations. This test assesses how quickly and accurately an individual can check and report for error/accuracy. Participants are shown two rows of 4 letters: one row in capitals and one in lower case. Participants must identify the number of matching letters (0, 1, 2, 3, or 4 pairs). It is a test of semantic encoding and perception. A high score would suggest the ability to: mentally match the features of letters and the meaning of symbols. It would also indicate the ability to detect misfits.

The *Numeracy Speed and Accuracy Test* is a test of numerical manipulation and a measure of basic numerical reasoning ability. It measures the degree to which an individual can work comfortably with quantitative concepts. It assesses the ability to work in environments where basic numeracy is required and wherever attention and concentration are required regarding numerical applications. Numeracy is required and wherever attention and concentration are required regarding numerical applications.

The *Word Meaning Test* assesses word knowledge and vocabulary. It assesses the comprehension of a large number of words from different parts of speech and the ability to identify the words that have similar or opposite meanings. It assesses the ability to work in environments where a clear understanding of written or spoken instructions is required.

The *Spatial Visualisation Test* assesses the ability to create and manipulate mental images of objects. This test correlates well with tests of mechanical reasoning and assesses an individual's ability to use mental visualisation skills to compare shapes. It relates to the ability to work in environments where visualisation skills are prerequisites for understanding and executing tasks. It assesses the suitability of an individual for tasks such as design work, where the individual must visualise how shapes and patterns fit together to form a whole.

The GIA has previously been shown to have high internal validity (with average test-retest correlations on individual test scores ranging from 0.75 to 0.86) and construct validity (total GIA score correlations with Raven's progressive matrices; $r = 0.74$; Dann, 2015).

4.2. Procedure

Participants completed both assessments online and were sent instructional text for each test via email. The test could then be taken at a time that best suits the participant. The data was collected through a