Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Personality and intelligence as predictors of creativity

Adrian Furnham *, Velicia Bachtiar

University College London, Department of Psychology, 26 Bedford Way, London WC1H OAP, United Kingdom

ARTICLE INFO

ABSTRACT

Participants completed the Big Five NEO-FFI (Costa & McCrae, 1992) as a personality measure, the Wonderlic Personnel Test (Wonderlic, 1992) as an intelligence measure, and four measures of creativity: Guilford's (1967) unusual uses divergent thinking test; the Biographical Inventory of Creative Behaviours; a self-rated measure of creativity; and the Barron–Welsh Art Scale to measure creative judgement. Extraversion was significantly related to all four measures of creativity. Intelligence failed to add any incremental variance in predicting the creativity scores. Multiple regression indicated that up to 47% of the variance in divergent thinking scores can be accounted for by the Big Five personality traits. Personality correlates to creativity vary as a function of the creativity measure.

© 2008 Elsevier Ltd. All rights reserved.

1. Introduction

Despite its practical importance, the multidimensional nature of creativity makes it particularly difficult to define and measure (Amabile, 1996; George & Zhou, 2001; Runco, 2004; Taylor, 1988). There are more than 60 definitions of creativity with no single authoritative and agreed upon definition, or operational measure. Nevertheless, the production of an idea or product that is both *novel* and *useful* is commonly accepted as a central characteristic of creativity (Barron, 1955; Mumford, 2003a, 2003b).

Increasing consensus amongst creativity researchers suggests that creativity in the individual will be reliant upon multiple components (Batey & Furnham, 2006; Guilford, 1950; Runco, 2004). Suggestions for these components include cognitive ability, personality factors (Feist, 1998), cognitive style (Wallace, 1961) and motivation (Maslow, 1971). However, there is growing agreement on the individual differences correlates of creativity (Batey, 2007). It is argued that a basic level of intelligence is a necessary requirement for creativity in the generation and analysis of novel ideas (Silva, 2008; Sternberg, 1997). However, intelligence only accounts for a small percentage of the variance, directing investigations towards personality correlates of creativity (Batey & Furnham, 2006). Equally it is suggested that the curiosity associated with Openness and the positiveness associated with Extraversion means trait variables are related to creativity.

Assessing creativity has mainly used divergent thinking (DT) measures and/or ratings of creativity as the main methods. However, Carroll (1993) suggested that creativity includes both fluency (numerate production of ideas) and originality (novel and unusual responses). Carrol concluded that intelligence factors such as verbal, visualisation and reasoning ability were found to be independent of creativity and that creativity is not the same as intelligence, but does require general mental abilities, such as the ability to think quickly. This suggests that a mixture of measures should be employed in order to appreciate the multidimensional nature of creativity (Sternberg & O'Hara, 2000).

1.1. Creativity and intelligence

The conception of creativity is often associated with intelligence. However, early investigations into the relationship between creativity and intelligence (Andrews, 1930; Getzels & Jackson, 1962; McCloy & Meier, 1931) have found only modest correlations ($r = .07, .22, .26$, respectively). Kaufmann (2003) argues that creativity assessments are often conducted in examination-like conditions similar to the conditions in which IQ tests are administered, which may have led to the poor convergent and discriminant validity of the creativity tests. The testing environment may influence mood, which in turn may influence the whole creativity process.

Silva (2008) has recently demonstrated that while measures of creativity (divergent thinking) are very modestly related to lower order cognitive ability scores (i.e. verbal fluency) the relationship is reasonably strong once a higher order intelligence factor is computed and even who confounding variables like Openness are controlled for.

1.2. Creativity and personality

In a meta-analysis, Feist (1998) investigated creative personality in the Arts and Sciences using data from 83 studies. Extraversion and Openness to Experience were found to be the traits that

---

* Corresponding author.
  E-mail address: a.furnham@ucl.ac.uk (A. Furnham).

most strongly distinguished the creative from non-creative scientists. It was also found that artists were roughly half a standard deviation lower on Conscientiousness and half a standard deviation higher on Openness to Experience. Furthermore, in a 45 year longitudinal study of 163 males, Soldz and Vaillant (1999) confirmed that Openness to Experience was positively related to the ratings of creativity ($r = 0.27$).

King, Walker, and Broyles (1996) found that verbal creativity (as measured by DT) was significantly correlated with Extraversion ($r = 0.26$) and Openness to Experience ($r = 0.38$). Other studies have used different creativity measures and have replicated the findings that these two traits are significantly implicated in creativity. Furnham, Batey, Anand, and Manfield (2008) found that Extraversion was a significant correlate of self-rated creativity ($r = 0.35$) and DT ($r = 0.26$). These findings are consistent with previous studies (Aguilar-Alonso, 1996; Sen & Hagtvet, 1993; Wuthrich & Bates, 2001). A possible explanation of this is that DT tests are often administered in group settings, which are advantageous for extraverts as they tend to seek stimulation (Eysenck & Eysenck, 1985). This may reduce the output of introverts and through masking the relationship with IQ, reduce the validity of the creativity tests. Other studies have also pointed to Openness as the most important factor in creativity (Furnham, 1999; Furnham & Chamorro-Premuzic, 2004).

1.3. Measuring creativity

It is evident that the multifaceted nature of creativity makes it necessary to adopt a multi-method approach, addressing different criteria of creativity to capture its many aspects and make findings more robust. Critics (Amabile, 1996; Hudson, 1966; Lubart, 2003) suggest that experiments using DT tests as a measure of creativity (e.g. Cropley, 1968; Getzels & Jackson, 1962; Wallach & Kogan, 1965) may measure aspects of creative intelligence, but it cannot be a stand-alone measure of creativity.

The present study aims to examine the incremental validity of intelligence and the big five personality factors in predicting different measures of creativity. A battery of four creativity tests, used in previous studies will be combined to assess different aspects of creativity. This will be used alongside the NEO Five-Factor Inventory of Costa and McCrae (1992) as a measure of personality, and the Wonderlic Personnel Test (Wonderlic, 1992) as a measure of intelligence.

Three hypotheses were tested. First (H1), it is hypothesised that intelligence will predict all four measures of creativity. Second (H2), Extraversion and Openness to Experience will significantly predict creativity scores for DT, creative achievements on the Biographical Inventory of Creative Behaviours, self-rated creativity, and creative judgement on the Barron–Welsh Art Scale.

2. Method

2.1. Participants

There were 176 participants of which 98 were male and 78 were female. Age ranged from 13 to 69 years; with a mean of 18.6 (S.D. = 7.26 years). Of all participants 95 were from a British private school (age: 13–15; mean 14.31) and the remaining 81 participants (age: 18–69; mean 24.41) were gathered from an opportunistic sample. English was a first language for 65.3% of participants and the remaining 34.7% had first languages other than English, however all were completely fluent and confident in English. Informed consent was obtained from each subject and the study was approved by the local ethics committee. Many were involved in art lessons which may have influenced their results on the art measure.

2.2. Measures

1. *Intelligence*: Intelligence was measured through the Wonderlic Personnel Test (WPT) (Wonderlic, 1992). This 50-item test measures general intelligence, and was administered in 12 min. Studies have reported good validity and reliability for this measure, and correlates very highly ($r = 0.92$) with the WAIS-R (Dodrill, 1983; Dodrill & Warner, 1988).
2. *Personality*: Personality traits were assessed through the NEO Five-Factor Inventory (FFI) of Costa and McCrae (1992). The 60-item scale is a self-report version of the NEO-PI-R. *t* is currently one of the most widely used measures of personality.
3. *Creativity*: Four different creativity measures were used:
   i) Divergent Thinking (DT): Three, 3-min tests of Guilford (1967) unusual uses were administered under strict timed conditions. Participants were asked to list as many unusual uses as they can for 3 inanimate objects (Paperclip, Blanket, and Pencil Case were used in this study). DT was scored by counting the number of responses for unusual uses.
   ii) Biographical Inventory of Creative Behaviours (BICB): An assessment of everyday creativity and creative achievement. Participants were asked to indicate from a list of 34 activities, those in which they had been actively involved in over the past 12 months. The BICB has demonstrated adequate reliability ($\alpha = 0.74$) (Batey, 2007).
   iii) Self-Rating of Creativity (SR):. Participants were asked in comparison to other people, on a scale of 1–10 (with 10 being the most), how creative do you consider yourself? It has been shown that creative people possess insight or awareness of their own creativity. Self-rated creativity has been found to significantly and positively correlate to several measures of creative potential (Batey, 2007).
   iv) Barron–Welsh Art Scale (BWAS): An 86-item test which asks participants to indicate whether they 'like' or 'dislike' the black and white figures. This is mostly simple abstract drawing of cylinders, irregular triangles, blocks, etc. High scorers indicate a greater ability for symbolizations and substitution, named primary processes. The BWAS has been used for over 50 years and converges significantly with other methods to identify creative talent (Eysenck & Furnham, 1993; Rosen, 1955; Welsh, 1987).
4. *Demographic Information:* Participants were asked to indicate their age, gender and first language.

2.3. Procedure

The paper and pencil tests were completed individually in a group administration session (around 10–15 people at a time) conditions, lasting approximately 45 min. The timed tests (WPT and DT) were administered first, and participants were subsequently allowed to complete the remainder of the tests at their own pace. Any further questions were attended to during the session.

3. Results

3.1. Data analysis

Table 1 shows test intercorrelations and that the DT tests were strongly and significantly intercorrelated with each other ($r = .73–.77$) suggesting that a valid composite DT score could be generated. The scale reliability (Cronbach's α) was also acceptably high ($\alpha > 0.70$) indicating internal validity of the measure (Bland & Altman, 1997).

Table 2 shows the composite DT score, BICB, SR and BWAS were significantly intercorrelated (r = .18–.44). However, only DT and