A Questionnaire explanation of the Relationship between Schizotypy, Creativity, and Academic Achievement

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March 2011
ABSTRACT

The study aimed to investigate the relationship between creativity and schizotypy, whilst assessing the best measure of creativity in relation to schizotypy. Further, the relationship between academic achievement and both creativity and schizotypy will be explored. The Biographical Inventory of Creative Behaviours (Batey, 2007), The IPIP scales of creativity and imagination (Goldberg, 1992; 1999), and DT tests measured creativity and The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE – Short Form) (Mason et al, 2005) measured schizotypy. Academic achievement was measured in terms of UCAS points.

Eighty participants (M = 34, F = 46) of all ages completed the online questionnaire. Pearson’s correlations, Fisher’s r transformation to z and step-wise multiple regressions were employed when assessing both creativity-schizotypy and academic achievement relationships. DT did not correlate with schizotypy whereas self-reported measures positively correlated with schizotypy ($p < .001$). Academic achievement did not significantly correlate with schizotypy, BICB, or DT, however correlated with IPIP Creativity. In conclusion, self-reported measures are good tests of creativity in relation to schizotypy and should be included in future research, as should creative styles.
Introduction

What is Schizotypy?

Schizotypy is a construct formulated by Rado (1956) who hypothesised that many cases of schizophrenia involve a genotype that interacts with environmental influences to produce a pattern of personality traits called the schizotype (Shean, 2004). Schizotypy is viewed as a continuum between 'normality' and schizophrenia, offering insight into the individuals’ proneness to psychosis (Claridge, 1997). Conventionally normalcy is insufficiently defined as the most common behaviour (Durkheim, 1982), however, many argue that the pursuit for normality has gone too far; ‘we’ve narrowed healthy behaviour so dramatically that our quirks and eccentricities, the normal emotional range of adolescence and adulthood, have become problems we fear and expect drugs to fix.’ (Lane, 2007: p8); it is these quirks and eccentricities, combined with an 'idiosyncratic style', that characterize schizotypy (Oldham & Morris, 1995).

The most comprehensive measure of schizotypy al traits is the Oxford-Liverpool Inventory for Feelings and Experiences (O-LIFE: Mason, Claridge, & Jackson, 1995) of which the reliability and validity has recently been re-established (Mason and Claridge, 2006); and which has been constructed into a shortened form (Mason et al, 2005). The O-LIFE has been utilised in numerous schizotypy studies, and in light of the long held belief of an association between 'madness' and genius (Nettle, 2001), has often been used to assess a relationship between creativity and schizotypy (eg, Batey & Furnham, 2008).

The O-LIFE consists of four scales corresponding to the four facets of schizotypy; “aberrant perception and beliefs”, “cognitive disorganisation”, “introvertive anhedonia” and “asocial behaviour”. Unusual Experiences (UnEx), refered to as positive schizotypy, is concerned with experiences not usually encountered in the normal population (e.g. Hallucinations). Introvertive Anhedonia (IntAn) is concerned with negative symptoms of psychosis (or exaggerations of symptoms found in the normal population) and refers to a tendency towards inability to gain pleasure from social and physical stimulation. The third dimension, known as Cognitive Disorganisation (CogDis) refers to disorganised thoughts and loosening of conceptual boundaries, relating to thought disorder in psychosis. Claridge et al (1996) argued that these three dimensions represent the central facets of schizotypy and parallel schizophrenic symptoms in a milder form. The O-Life also includes a fourth dimension, Impulsive Nonconformity (ImpNon), measuring impulsive behaviour, lack of control and asocial aspects of psychosis. This dimension is based upon both Eysenck’s Psychoticism scale (Eysenck & Eysenck, 1975) and the hypomania construct; however, is often not recognised in this form (Venables and Rector, 2000).

What is Creativity?
Runco (2004) held that the importance of creativity for humankind is undeniable. Whilst no single definition or standard measurement has been converged upon, there is ‘a general agreement that creativity involves the production of novel, useful products’ (Mumford, 2003; p.107); with the creative process bearing its foundations in an individuals’ ability to draw upon experiences or ideas, that are subsequently united and reformed in a novel manner (Folley & Park, 2005). Creativity within an individual is professed to encompass the amalgamation of multiple components (Amabile, 1996; Batey & Furnham, 2006); a supposition leading to the constitution of various paradigmatic approaches including (Wolfradt & Pretz, 2001): psychodynamic, (Batey & Furnham, 2006), cognitive (Silvia, 2008), and social-personality (Feist, 1998).

An imperative deliberation in creativity research is the types of people, and the fields within which they study, profess, or work, who are deemed creative. Researchers have looked solely at poets, painters, and musicians as ‘artists’, which has been criticised by Sass (2000-2001), who maintains that other fields, such as philosophy and physics, are also associated with creative people. It is a fairly recent concept that creativity can be classified into distinct groups or types (Sass, 200-2001; Weisberg, 2006). Hence, the present study aims to incorporate all types of creativity in order to gain a wholly representative sample.

As a consequence of its diversity, multiple tests are signified as necessary to measure creativity (Furnham et al, 2008). Since Guilford (1967), divergent thinking (DT) tests have been used as a measure, and are defined as the ability to generate a broad range of ideas. DT is a construct thought to include components such as fluency, flexibility, originality, and elaboration (Runco, 1991), and is recognised as a good measure of creativity (Burch et al, 2006). However, Nettle (2006) found that DT was only related to artistic creativity as opposed to mathematical creativity. Additionally, Claridge and Blakey (2009) did not observe a relationship between other creativity measures and DT, confounding support for the test. Mumford (2003) has suggested that an overreliance on DT tests can be problematic for creativity research by raising method bias in theory and findings, implying a need for other tests of creativity.

A possible alternative to DT tests are self-rated measures. There is evidence that creative people possess insight into or awareness of their own creativity (Barron & Harrington, 1981) making self-rated creativity a valid, and recently much used measure (Carson et al., 2005; Furnham et al., 2008). Self-rated measures allow research to ‘gain a broader perspective on creativity’ (Sternberg & Lubart, 1992), providing insight into creative opinions, something not possible in DT measures. Self-report measures are concluded to be a superior test for creativity; nevertheless they have not been implemented in much research in relation to schizotypy, thus they are employed in the present study.

A brief measure of creative production or achievement can be obtained through biographical inventories of purportedly creative behaviours. Hocevar
and Bachelor (1989) contended the self-report inventory of creative achievement to be the most defensible measure of creativity; therefore, the current study will utilise the Biographical Inventory of Creative Behaviours (BICB) (Batey, 2007).

**Schizotypy and Creativity**

Research increasingly examines the relationship between creativity and non-clinical measures of psychopathology such as schizotypy (Nettle, 2006). The quantity of literature exploring the relationship between creativity and schizotypy is substantial (Fisher et al, 2004). Many contemporary studies have demonstrated that individuals active in creative arts have elevated levels of various schizotypal traits (Brod, 1997; Nettle, 2001; Schuldberg, 1988, 2000). Nettle (2006) provides support for this association in a study comparing the schizotypal profiles (using the O-Life Inventory) of artists, mathematicians, and the clinical and non-clinical population. It was discovered that artists showed increased levels of some schizotypal traits in relation to the general non-clinical population. Therefore confirming the suggestion that artists score more highly on measures examining the positive dimensions of schizotypy (Rawlings & Locarnini, 2008).

Furthermore, positive correlates between creativity and positive schizotypy have been observed, often measured by the UnEx scale of the O-LIFE, and also between asocial schizotypy, measured by ImpNon (Batey and Furnham, 2008; Burch et al, 2006). CogDis is also found to be positively correlated to creativity (Burch et al, 2006); however differences between types of creativity have been found. Nettle (2006) distinguished between artistic creativity and scientific creativity, finding that artistic creatives scored higher on UnEx and CogDis, and lower on IntAn. It has been suggested that this is due to the over-inclusive cognitive style (Eysenck, 1993), and the involvement of remote associations by divergent thinkers (Mednick, 1962). This is extremely similar to the thought-processing style associated with the CogDis facet of schizotypy. These results exemplify the somewhat debateable nature of DT measures and imply that there are differences in types of creativity.

Moreover, researchers have affirmed DT measures to be ambivalent, when DT did not correlate with schizotypy compared to other measures (Claridge and Blakey, 2009; O'Reilly et al, 2001; Shuldberg et al, 1988). O'Reilly et al (2001) reasoned this was because DT is specifically associated with psychoticism, as a personality trait (Eysenck and Eysenck, 1976), instead of the more clinically derived concept of schizotypy. In employing self-rated, verbal and drawing creativity as measures, Miller and Tal (2007) found positive correlations between positive schizotypy and creativity, concluding that schizotypy better predicts self-reported creativity than other measures. Claridge and Blakey (2009) construe that various measures are essential for creativity, as individual measures tap into different creative aspects which relate differentially to schizotypy.
Academic Achievement

Achievement is a fundamental aspect of everyday life, affecting people’s work, interpersonal relationships, sense of being, and leisure (Struthers, Menec, Schonwetter, & Perry, 1996). The quintessential achievement-oriented domain in education, particularly for college students, includes high performance on tests, passing courses, and completing degrees. Academic achievement has been a topic of considerable interest and research for a significant length of time. Many studies have sought to determine the factors that enhance academic achievement. Including the examination of personality, cognitive ability, psychological and demographic factors correlating with academic achievement (Kuncel et al., 2010; Ruban & McCoach, 2005), in particular creativity (Hirsh & Peterson, 2008; Kobal & Musek, 2001; Struthers et al., 1996). The implications of these relationships for education are apparent since achievement in skill, concepts, and content are the acknowledged goals of the education process (Palaniappan, 2005).

In general, researchers assess academic achievement in three ways: school grades, standardized test scores, and teacher ratings. Although there are several disadvantages connected to the use of standardized tests, this type of achievement indicator has an important methodological advantage over teacher ratings and school grades, in that the results can be generalized and compared over teachers, classes, and schools. Therefore the current study will utilize standardized test scores when assessing academic achievement.

Academic achievement and Creativity

Unlike creativity, which has been subject to many different definitions, academic achievement is relatively easily defined, measured and interpreted (Palaniappan, 2005, p.36). Much research has concluded that there exists a positive relationship between creativity and academic achievement (Asha, 1980; Cicirelli, 1965; Counts, 1971; Murphy, 1973). Getzels and Jackson (1962) observed that achievement test performance, of an experimental group of highly creative students, was significantly superior to the school population, surprising, as the highly creative group were found to have below average IQ. Correspondingly, Yamamoto (1964) demonstrated that highly creative students performed significantly better than those with low creativity, regardless of the subject matter.

Although creativity has been found to be a positive correlate of academic performance (Sen & Hagtvet, 1993), the personality correlates of creativity are uncertain (Aguilar-Alonso, 1996; Furnham, 1999; Stavridou & Furnham, 1996). Kumar (1978) reported higher creativity test scores for introverts, while Di Scipio (1971) and Richardson (1985) found positive correlations between creativity and Extraversion. Further, creativity and Openness (a factor which is expected to correlate positively with academic attainment) have been conceptualised as related constructs, for instance in McCrae and Costa (1997). It thus seems important to examine whether a measure of creativity can be useful to predict academic performance.
Edwards and Tyler (1965) attempted to replicate the findings of Getzels and Jackson (1962), concluding that creativity is not related to school performance. Further opposition emerged from research reporting low correlations between school achievement and creativity test scores (Ai, 2010; Haddon & Lyton, 1968; Krause, 1972, 1977). A suggestion for the cause of the discrepancy between findings is that creativity relates to higher-level achievement, which involves divergent verbal behaviours (Shin & Jacobs, 1973), and evaluative abilities (Bentley 1966).

The relationship between schizotypy and academic achievement is a substantially under explored area. However, a personality factor which has been frequently associated with (poor) academic performance is Psychoticism (Goh and Moore, 1978; Maqsud, 1993; Furnham and Medhurst, 1995; Aluja Fabregat and Torrubia-Beltri, 1998, Sanchez-Marin et al., 2001). Psychoticism and schizotypy are terms which have previously been used interchangeably (Raine, Lencz, and Mednick, 1995). Further, Claridge (2009) asserted that schizotypy should be revised to include all psychotic traits and relabelled ‘psychoticism’.

**Aims and Hypotheses**

The primary aim of the study was to assess the acknowledged relationship between creativity and schizotypal personality, whilst assessing their lesser-acknowledged relationship with academic achievement. Findings may highlight which measures are the most effective tests for creativity, in relation to schizotypy, since self-report measures have often not been used in this way. The Biographical Inventory of Creative Behaviors (BICB) (Batey, 2007), and the International Personality Item Pool (IPIP) (Goldberg, 1999) were used as measures of self-reported creativity, and two DT tests (Guilford, 1967) measure creative ability. The O-LIFE – short form was used to measure schizotypy. By calculating the number of UCAS points each participant has obtained, the study explored the ability of both creativity and schizotypy to predict academic achievement. Additionally, creativity was examined in relation to the four sub-scales of the O-LIFE – short form, in order to investigate which dimensions of schizotypy are most highly related to creativity.

It was hypothesised that:
H1: Self-rated creativity will correlate significantly more with schizotypy (overall O-LIFE score) than DT.
H2: There will be a significant and negative correlation between creativity and IntAn.
H3: There will be significant and positive correlations between creativity and UnEx.
H4: There will be significant and positive correlations between creativity and ImpNon.
H5: There will be significant and positive correlations between creativity and CogDis.
Method

Design

The predominant factors in this study are academic achievement, creativity, and schizotypy. Creativity is investigated utilising two self-report measures, and two divergent thinking tests. Schizotypy will be measured using the Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE-short form) (Mason et al, 2005), the four sub-scales of the O-LIFE will be considered. This investigation adopted a correlational design, assigning participants a numeric score on each factor.

Participants

This study involved 80 participants, of these participants, 57.5% were female (N=46) and 42.5% were male (N=34). The age of participants ranged from 19-57, the mean age was 23.31 (SD=7.18).

Participants were recruited via an online opportunistic sample. The online recruitment of participants allowed the research to target a much wider sample, in comparison to collecting participants within the university campus. The selection criteria required participants to be at least 18 years old, and to have achieved a GCE, BTEC, or equivalent level qualification.

Materials

The website ‘www.freewebs.com’ was employed when designing and building the informative website (Appendix One). This website permits access to the questionnaire, hosted by ‘www.freeonlinesurveys.com’ (Appendix Two). The questionnaire presents the amalgamation of the six individual measures listed below:

Measures:

Divergent Thinking (DT)

DT was measured using Guilford’s Alternative Uses Task (1967). Participants were told to think of as many possible uses for a brick and a newspaper. Three minutes were allocated for each object, as participants often give their least creative answers in the first two minutes (Dow, n.d.), and three minutes has been implemented in previous studies (Furnham et al, 2008).

The DT tasks were scored according to Guilford (1967), where scoring comprises of four components: originality (uniqueness of responses), fluency (total number of responses given), flexibility (different categories), and elaboration (of detail). However, Hocevar (1979) found a contamination
problem of fluency on originality. Thus, originality was scored by finding the originality score, then dividing it by fluency, according to Glover et al (1989). The measure has good reliability ($\alpha=0.74$).

**Self-Rated Creativity Measures**

The Biographical Inventory of Creative Behaviours (BICB) (Batey, 2007) was employed to determine self-assessed everyday creative achievement (see Appendix Three) and consists of 34 items describing creative activities, which participants may have been actively involved in over the past 12 months, items include ‘written a short story’. The BICB is scored simply by totaling the number of items participants had indicated involvement in; a higher score indicates higher creativity. Good reliability has been found for this scale ($\alpha=0.74$).

Creativity was measured using a ten-item scale taken from the International Personality Item Pool (IPIP) (Goldberg 1992; 1999). This was combined with a second ten-item IPIP scale measuring Imagination. The twenty items are answered using a Likert type scale, where answers range from 1 (very accurate) to 5 (very inaccurate). The reported Cronbach Alpha Coefficient of the creativity measure is 0.81, and 0.78 for the imagination scale (Appendix Four).

**Schizotypy Measure**

The Oxford-Liverpool Inventory of Feelings and Experiences (O-LIFE-short form) (Mason et al, 2005) (Appendix Five) was used to measure schizotypy. The O-LIFE-short form, a self-report measure, consists of 43 items with a dichotomous response format, ‘yes’ or ‘no’; measuring the four previously mentioned dimensions, UnEx (12 items), CogDis (11 items), IntAn (10 items), and ImpNon (10 items). The scale has good internal consistency ($\alpha=0.77$) and is scored according to Mason et al (2005).

**Academic Achievement**

Participants were asked to provide information regarding their previous academic achievement (Appendix Six), at GCE, BTEC, or equivalent. The grades supplied by the participants were given a numeric value using the UCAS Tariff tables (UCAS, 2009).

**Procedure**

As the study was performed entirely online, the first requirement of the investigation was to design and build a way for participants to access the questionnaire whilst still providing informed consent. Therefore, access was only permitted by first visiting a purpose built website, aimed primarily towards briefing participants, providing any information required regarding the
questionnaire and study, and the researchers contact details. Further, the website provided a forum in which information and results could be posted prior to the collection of data. This website was hosted by ‘www.freewebs.com’.

Subsequently, the website ‘www.freeonlinesurveys.com’ was selected as the most appropriate platform from which to host the questionnaire, based upon time and financial constraints. The six individual measures were amalgamated to create one questionnaire. This decision was taken as it presents the least complex design for respondents, by reducing the multitude of links, which would otherwise be necessary. The questionnaire additionally requests demographic information including age, gender, and degree course studied. The host website has several rules for the structure and formatting of items, and so some slight amendments were made to the structure of the measures (See Appendix Seven). Prior to the completion of the questionnaire, a hyperlink was created connecting the informative website with the fully functioning questionnaire. Consideration was taken regarding the promotion of the constructed website when recruiting participants. Promotional outlets included creating an interest group on the social networking website ‘www.Facebook.com’.

A pilot study was performed, 15 participants were recruited (N=15), via an opportunity sample; of these participants 6 were male and 9 were female, with a mean age of 21.25. Participants completed the study online, as proposed in the main study. As a means of facilitating the feedback process, participants were approached by the researcher in person, and encouraged to complete the questionnaire whilst in the researcher’s company. This manner of recruitment allowed for instantaneous feedback. As a result of the pilot study amendments were made to the sequence in which the individual measures appeared in the amalgamated questionnaire, beginning with the BICB, followed by the two self-rated IPIP creativity scales, the O-LIFE –Short form, the two DT measures, and concluding with the brief academic achievement question. An indication of the length of time required to complete the study was gained, with times ranging from 16.45 to 22.33 minutes, with a mean time of 19.51 minutes. Therefore, participants were advised that the questionnaire would take approximately 20 minutes to complete in the main trial. The responses from the DT measurement in the pilot study reveal a wide range of responses, demonstrating good data in terms of scoring, when using Guilford (1967).

**Statistical Analysis**

Data was analysed using SPSS version 18 for Windows. Based on initial exploratory statistics, variables were input to a correlation matrix, to explore relationships between data. Based on the results of the matrix, multiple regressions were performed. Independent samples t-tests were used to explore differences in gender.
Ethical Considerations

This study was conducted within the set British Psychological Society (BPS) guidelines; in addition, the BPS guidelines for conducting research online were adhered to. Before the commencement of this investigation, the Manchester Metropolitan University ethics committee required the submission and approval of two ethics forms (Appendix Twelve and Thirteen).

After consulting the BPS guidelines for online research (BPS, 2007) the decision was taken only to allow participation in the study via a purpose built website, ensuring informed consent was given, providing participants with debriefing information, and providing a forum for any findings to be posted (available from 1st April 2011).

Participants were informed of their right to withdraw at any point during the investigation. In accordance with a suggestion from the BPS guidelines for online research (BPS, 2007) if a participant exits the browser part way through the investigation, that was understood as withdrawal from the study, therefore no partial data was used. Respondents were advised that by selecting ‘finish’ at the end of the questionnaire, they are giving permission for their responses to be used in the study, and would not later be able to retract their submission.

The study did not involve deception and did not present a danger to the participants or the researcher. Participants were however provided with the researcher’s contact details, and were encouraged to make contact if they had any questions or concerns.

Results

Before the commencement of statistical analyses, the internal reliability of the individual scales (BICB, IPIP- Creativity and Imagination, DT, O-LIFE-short form, and the four sub-scales of the O-Life) was tested. The Cronbach’s Alpha (α) for the overall data was found to be excellent (George & Mallery, 2003)
Table 1: Cronbach’s Alpha for each of the variables, including the four sub-scales of the O-LIFE- short form.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of items in variable score</th>
<th>Cronbach’s alpha</th>
<th>95% Confidence Interval for alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>BICB</td>
<td>34</td>
<td>.72</td>
<td>.62</td>
</tr>
<tr>
<td>IPIP Total</td>
<td>20</td>
<td>.85</td>
<td>.79</td>
</tr>
<tr>
<td>IPIP Creativity</td>
<td>10</td>
<td>.77</td>
<td>.68</td>
</tr>
<tr>
<td>IPIP Imagination</td>
<td>10</td>
<td>.88</td>
<td>.83</td>
</tr>
<tr>
<td>DT</td>
<td>2</td>
<td>.72</td>
<td>.57</td>
</tr>
<tr>
<td>O-LIFE</td>
<td>43</td>
<td>.84</td>
<td>.78</td>
</tr>
<tr>
<td>UnEx</td>
<td>12</td>
<td>.74</td>
<td>.65</td>
</tr>
<tr>
<td>CogDis</td>
<td>11</td>
<td>.80</td>
<td>.73</td>
</tr>
<tr>
<td>IntAn</td>
<td>10</td>
<td>.80</td>
<td>.73</td>
</tr>
<tr>
<td>ImpNon</td>
<td>10</td>
<td>.60</td>
<td>.45</td>
</tr>
</tbody>
</table>

It can be deduced from Table 1 that the BICB was found to have acceptable reliability ($\alpha = .7$), as was DT ($\alpha = .7$). The IPIP was found to have excellent reliability ($\alpha = .9$) when the short scales for creativity and imagination were combined. Individually, the IPIP creativity scale was found to have good reliability ($\alpha = .8$), whereas the IPIP imagination scale was found to have excellent validity ($\alpha = .9$). The O-LIFE scale was found to have good reliability ($\alpha = .8$). The CogDis and IntAn sub-scales of the O-LIFE were found to have good reliability ($\alpha = .8$), and the UnEx sub-scale was found to have acceptable reliability ($\alpha = .7$). The ImpNon sub-scale was found to have reliability that is lower than the generally accepted figure ($\alpha = .7$) in this sample population ($\alpha = 6$), however, as shown in the table, in the general population the reliability could reach $\alpha = .72$.

Descriptive Statistics

Table 2: Descriptive Statistics for variables (N=80).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>19</td>
<td>57</td>
<td>23.31</td>
<td>7.18</td>
</tr>
<tr>
<td>BICB</td>
<td>0</td>
<td>18</td>
<td>8.71</td>
<td>4.25</td>
</tr>
<tr>
<td>DT</td>
<td>10</td>
<td>40.33</td>
<td>21.09</td>
<td>7.28</td>
</tr>
<tr>
<td>IPIP Total</td>
<td>42</td>
<td>92</td>
<td>69.76</td>
<td>10.71</td>
</tr>
<tr>
<td>O-LIFE</td>
<td>0</td>
<td>33</td>
<td>16.85</td>
<td>7.23</td>
</tr>
<tr>
<td>UnEx</td>
<td>0</td>
<td>11</td>
<td>4.81</td>
<td>2.98</td>
</tr>
<tr>
<td>Cog Dis</td>
<td>0</td>
<td>11</td>
<td>5.52</td>
<td>3.09</td>
</tr>
<tr>
<td>IntAn</td>
<td>0</td>
<td>9</td>
<td>2.48</td>
<td>2.55</td>
</tr>
<tr>
<td>ImpNon</td>
<td>0</td>
<td>8</td>
<td>4.03</td>
<td>2.11</td>
</tr>
<tr>
<td>UCAS Points</td>
<td>40</td>
<td>440</td>
<td>258.63</td>
<td>80.25</td>
</tr>
</tbody>
</table>
Table 2 shows that the mean score on IPIP (M=69.76) falls above the mid-score (50) for this scale. Suggesting that, on average, the sample population displays above average creative traits. In contrast, the mean score on BICB (M=8.71) falls well below the mid-score (17) for this scale, showing that, on average, the sample population engages in limited creative behaviours.

The above table shows that the mean score on the O-LIFE (M=16.85) falls below the mid-score (21.5) for this scale. Indicating that on average the sample population does not show a high number of schizotypal traits.

Independent samples t-tests were used to look for effects of gender. An effect was found on IPIP Imagination, \( t(78)= -3.21, p<.005 \), where females (M=37.39) score higher than males (M=32.06). No other significant differences were found in gender on the other scales.

**Correlations Between Measures**

Variables were input to a correlation matrix (Appendix Nine), the results of which are presented below.

**Schizotypy and Creativity**

**O-LIFE and DT**

No significant correlation between overall O-LIFE scores and DT was found; however, there was a significant positive correlation between overall DT scores and UnEx \( r=.404, p<.001 \). Further, a negative correlation was found between overall DT scores and IntAn \( r= -.282, p=.011 \).

**O-LIFE and BICB**

A significant positive correlation was found between BICB scores and overall O-LIFE scores \( r= .475, p<.001 \). Moreover, significant positive correlations were found between BICB scores and UnEx \( r= .708, p<.001 \) and IntAn \( r= .461, p<.001 \).

**Figure 1:** Scatter graph showing the strongest relationship found in the present study, between BICB and UnEx. The linear regression line and the 95% confidence interval is shown.
A significant positive correlation was found between overall IPIP scores and overall O-LIFE scores ($r=.361$, $p=.001$). Further, significant positive correlations were found between overall IPIP score and UnEx ($r=.494$, $p<.001$) and CogDis ($r=.376$, $p=.001$).

The creativity subscale of IPIP shows a significant positive correlation with UnEx ($r=.256$, $p=.022$), but no significant correlation was found between IPIP Creativity and overall O-LIFE scores ($r=.115$, $p=.311$). In contrast, the IPIP subscale for imagination showed a significant positive correlation with overall O-LIFE scores ($r=.417$, $p<.001$), UnEx ($r=.500$, $p<.001$), CogDis ($r=.482$, $p<.001$), and ImpNon ($r=.262$, $p=.019$).

No significant correlation was found between UCAS Points and overall O-LIFE score ($r=.051$, $p=.653$). Similarly, no significant correlation was found between UCAS Points and BICB score ($r=.148$, $p=.189$) and overall DT score ($r=.018$, $p=.875$).

However, a significant positive correlation was found between UCAS Points and overall IPIP score ($r=.250$, $p=.025$); moreover, the IPIP Creativity subscale was found to have a strong significant positive correlation with UCAS Points ($r=.397$, $p<.001$), whereas the IPIP Imagination subscale showed no significant correlation with UCAS Points ($r=.064$, $p=.575$).
The Fisher’s $r$ transformation to $z$ function (Appendix Ten) was employed to explore which of the creativity tests, self-reported or DT, correlated most significantly with O-LIFE. A self-rated creativity score was derived by computing the average of the two correlation coefficients, BICB and IPIP, using the Fisher’s $r$ transformation to $z$ function ($r=.42$); when compared to the correlation between DT and O-LIFE ($r=.03$) it can be seen that self-report measures of creativity correlate more significantly with O-LIFE than DT. However, when the correlation between self-rated creativity and DT was ($r=.41$) examined, using the Fisher’s $r$ transformation to $z$ function, it can be seen that there is no significant difference in correlation between self-rated creativity and both O-LIFE and DT.

### Regression Analyses

Regression analyses were conducted to establish which creativity scales best predicted schizotypy (O-LIFE scores). Independent variables were entered into the models according to previously found significant correlations from the present study and previous research.

#### Creativity and O-LIFE

Step-wise multiple regression was used to examine the influence of self-reported creativity measures on O-LIFE, the dependent variable, as a measure of schizotypy.

**Table 4: Step-wise multiple regression on O-LIFE (N=80)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$B$</td>
<td>$SE$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>Constant</td>
<td>9.80</td>
<td>1.64</td>
<td>2.55</td>
</tr>
<tr>
<td>BICB</td>
<td>.81</td>
<td>.17</td>
<td>.48***</td>
</tr>
<tr>
<td>IPIP Imagination</td>
<td>.25</td>
<td>.10</td>
<td>.27*</td>
</tr>
<tr>
<td>IPIP Total</td>
<td></td>
<td></td>
<td>-0.04</td>
</tr>
<tr>
<td>$R^2$</td>
<td>.23</td>
<td>.29</td>
<td>.26</td>
</tr>
<tr>
<td>$F$ for change in $R^2$</td>
<td>22.73</td>
<td>6.66</td>
<td>.03</td>
</tr>
</tbody>
</table>

It can be seen from Table 4 that the two significant predictors of O-LIFE score are BICB and IPIP Imagination, (Adj $R^2= 0.27$; $F(2,79)= 15.52$, $p<.001$), which accounted for approximately 29% of the variance.

#### O-LIFE – UnEx

Step-wise multiple regression was used to examine the influence of positively correlated creativity measures on UnEx, as the dependent variable.
**O-LIFE – ImpNon**

Step-wise multiple regression was used to examine the influence of positively correlated creativity measures on ImpNon, as the dependent variable. As was found in Table ?, the only significant predictor was BICB, (Adj R² = .20; F(1,79) = 21.05, p<.001), which accounted for approximately 21% of the variance.

Table: Step-wise multiple regression on O-LIFE – ImpNon.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE B</td>
</tr>
<tr>
<td>Constant</td>
<td>2.02</td>
<td>.49</td>
</tr>
<tr>
<td>BICB</td>
<td>.23</td>
<td>.05</td>
</tr>
<tr>
<td>IPIP I</td>
<td>.03</td>
<td>.03</td>
</tr>
<tr>
<td>R²</td>
<td>.21</td>
<td>.22</td>
</tr>
<tr>
<td>F for change in R²</td>
<td>21.05</td>
<td>.73</td>
</tr>
</tbody>
</table>

**O-LIFE – CogDis**

Step-wise multiple regression was used to examine the influence of positively correlated creativity measures on CogDis, as the dependent variable. It was found that the only significant predictor was , (Adj R² = .22; F(1,79) = 23.6, p<.001), which accounted for approximately 23% of variance.

**Creativity**

Step-wise multiple regression was used to examine the influence of DT and the most salient IPIP subscale on BICB, the dependent variable, as a self-reported measure of creativity.

Table 4: Step-wise multiple regression on BICB (N=80)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE B</td>
<td>β</td>
</tr>
<tr>
<td>Constant</td>
<td>2.16</td>
<td>1.25</td>
<td>-2.47</td>
</tr>
<tr>
<td>DT</td>
<td>.31</td>
<td>.06</td>
<td>.53</td>
</tr>
<tr>
<td>IPIP</td>
<td>.16</td>
<td>.05</td>
<td>.29</td>
</tr>
<tr>
<td>Imagination</td>
<td>-.008</td>
<td>.07</td>
<td>-.11</td>
</tr>
<tr>
<td>IPIP Total</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>.28</td>
<td>.36</td>
<td>.36</td>
</tr>
<tr>
<td>F for change in R²</td>
<td>30.87</td>
<td>9.22</td>
<td>.01</td>
</tr>
</tbody>
</table>
It can be seen from Table 4 that the two significant predictors of BICB, are DT and IPIP Imagination, \((\text{Adj } R^2=.34; \ F(2,79)=21.67, \ p<.05)\), which accounted for approximately 36% of the variance.

**Discussion**

This study found evidence for the hypothesis that self-reported measures are a more reliable measure of creativity in relation to schizotypy than DT tests; thus providing support for H1. The main findings were that self-reported measures correlated with and predicted several elements of schizotypy, thus providing evidence of a link between creativity and psychosis, consistent with previous research.

The only significant correlation between DT and schizotypy was with UnEx, which was positive \((r=.404, \ p<.001)\), and with IntAn which was negative \((r=-.282, \ p=.011)\). A possible explanation for this is the finding that ‘hypomanics’ presented higher DT than ‘schizotypals’ (O’Reilly et al., 2001) suggesting that creative cognition is more analogous to manic ‘flight of ideas’ than schizophrenic ‘loose associations’ (Barrantes-Vidal, 2004). This suggests DT may be more suited to measuring features of bipolar disorder, as Nettle (2006) highlighted, however, if this was the case, DT may have correlated with ImpNon, as the scale that measures psychosis-proneness (Mason and Claridge, 2006), yet there was no significant correlation \((r=.119, \ p=.30)\), confounding O’Reilly et al (2001).

Further, it may be due to differences in types of creativity, between artistic and scientific, according to Nettle (2006). Based on the assumption that artistic and scientific creativity overlap (Weisberg, 2006), this study specifically targeted the general population, not distinguishing between creative types. However, when looking at participants’ degree titles (see Appendix Nine), there were more scientific degree subjects \((n=50\) compared to artistic degrees \((n=30)\). Therefore, DT scores may not have correlated as there were, unintentionally, more scientific creatives who are less associated with DT (Nettle, 2006). This reasoning may also explain Claridge and Blakey’s (2009) finding that DT did not correlate with positive schizotypy as they too had unequal numbers of creative types. This corresponds with the view that scientists relate more to convergent thinking (Claridge and McDonald, 2009). Nevertheless, it seems that DT is a measure not wholly understood. It may be more related to measuring other psychopathologies, such as bipolar disorder, however it seems more likely that it relates differently to specific types of creativity.

The finding that DT did not correlate with schizotypy adds to the conflicting results of previous research and supports the claim that self-reported measures are more reliable tests of creativity. An interesting consideration however, is the finding that there is no significant difference in the correlation between self-reported creativity and both O-LIFE \((r=.42)\) and DT \((r=.41)\). This finding shows that whilst O-LIFE and DT do not significantly
correlate, both measures significantly correlate with self-reported creativity, indicating some ambiguity in the constructs measured by the BICB and IPIP.

BICB scores correlated with IPIP ($r=.365, p=.001$), identifying itself as a good measure of creativity. It also corresponds to the assumption that the best predictor of future creativity is past creative behaviour (Colangelo et al., 1992). Moreover, the regression analyses showed that IPIP Imagination and DT were the main predictors of BICB scores which, although showing that it is a good measure of creativity, it overlaps with self-reported measures. It is also surprising that DT total predicts self-reported creativity, however, this may be due to the combination of Burch et al's (2006) proposal that DT concerns the willingness to give anti-social responses and the observation that the BICB contains individualised activities which are more anti-social (Batey and Furnham, 2008).

There was minimal support for the negative role of Introvertive Anhedonia in creativity, providing only partial confirmation of H2. It was found that whilst IntAn was not significantly correlated with BICB or IPIP, a significant negative correlation was found with DT ($r=-.282, p<.05$); this correlation presents a minimum to moderate effect size according to Ferguson (2009). The finding that IntAn was not significantly negatively correlated with BICB or IPIP in the correlational matrix, indicates that self-reported creativity is not dependent upon perceived sociability and that engagement in creative behaviours is also independent of enjoyment of social and physical pleasure. In turn, the observation relating to IntAn may be explained by the inclusion of several activities in the BICB, which could be popular for those who avoid direct social contact (e.g. planning a website, writing a story or a poem, etc.). It may be that a negative relationship of IntAn would be observed to the BICB if only socially oriented activities were included (e.g. choreographed a dance). In contrast, Burch et al (2006) reasoned that DT is related to the desire to shock people, and that DT scores may simply reflect the willingness to voice antisocial ideas rather than ability to construct unique thought. Therefore, the anonymity and privacy of completing the questionnaire from one's home may have encouraged participants to respond in a way not usually socially accepted (Richards, 2000-2001). Therefore the present observed negative correlation suggests that DT is more competent in measuring negative schizotypy than the BICB and implies that creative styles are undoubtedly significant, relating differently to the various aspects of schizotypy. This is consistent with Claridge et al (1998) who commented that various types of creativity map onto different aspects of psychosis and that, even within numerous creative fields, distinctions in creative processes and styles will arise, which relate to different cognitive and personality traits.

It was anticipated (H3) that there would be positive relationships between Unusual Experiences and the creativity measures. This hypothesis was confirmed, in that the IPIP ($r=.49, p<.001$), the BICB ($r=.71, p<.001$) and DT ($r=.50, p<.001$) were positively related to Unusual Experiences, presenting moderate to strong effect sizes (Ferguson, 2009). This indicates that self-perceptions of what constitutes the label 'creative' are related to self-perceived unusual ideational experiences. This, in turn, may be explained with
reference to the common notion that psychopathologies are indicative of genius (Ludwig, 1995) or creativity (Jamison, 1993; Lloyd-Evans, Batey, & Furnham, 2006). Further, it may be contended that the thinking style of the creative person is shared to a degree with schizophrenia and the schizotypal personality (Green & Williams, 1999). Therefore, confirming the contention of Runco (2004) that the genes that contribute to both schizophrenia and creativity have been preserved due to the importance of creativity to humankind.

There was partial support for the expected relationship, as stated in H4, between Impulsive Nonconformity and the creativity measures used in this study. ImpNon was found to correlate with the BICB ($r=.46$, $p<.001$) and the IPIP imagination subscale ($r=.26$, $p=.02$), although both presenting less than moderate effect sizes (Ferguson, 2009), however ImpNon did not correlate with IPIP creativity and DT. This may again be due to differences in types of creativity, as previous research has revealed a difference between visual artists and non-artists in impulsive nonconformity scores (Burch et al., 2006), a finding that was not shown by O’Reilly et al (2001).

It was anticipated (H5) that there would be a significant positive correlation between Cognitive Disorganisation and creativity. This hypothesis was only partially supported, in that only IPIP Imagination was found to be positively correlated ($r=.482$, $p<.001$) with CogDis. Providing support for Nettle (2006), who distinguished between types of creativity, finding that artistic creatives scored higher on CogDis. Thus, Burch et al’s (2006) finding of a positive correlation to CogDis may actually have been due to the type of creativity (visual artists and non-artists) affecting DT scores rather than schizotypy. Additionally, the statistical analyses used (2x2 MANOVA on 13 variables) may have been too simplistic in comparison to other studies, hence if post-Hoc tests, or correlation or regression analyses, had been performed a relationship may not have been found. It is suggested that this distinction is due to the over-indulgent cognitive style (Eysenck, 1993), and the involvement of remote associations by divergent thinkers (Mednick, 1962); which are extremely similar to the thought-processing style associated with the CogDis facet of schizotypy.

In relation to academic achievement, the only measure which significantly correlated was the Creativity subscale of the IPIP ($r=.40$, $p<.001$), which presents a minimum to moderate effect size (Ferguson, 2009). This finding is consistent with previously found ambivalence in the relationship between creativity and academic achievement (Ai, 2010; Haddon & Lyton, 1968) and indicates the need for further research, perhaps examining the personality constructs and learning styles which correlate with academic achievement, in relation to creativity (Aguilar-Alonso, 1996; Furnham, 1999).

There were a number of limitations which need be acknowledged before an examination of the implications of this study. As the study was conducted entirely online, it possible that a sampling bias has been created, in selecting participants of a certain age, socio-economic status and educational background. The participants in this study presumably have access to a
computer and the appropriate knowledge of how to use a computer. However, information technology only became a compulsory component of the Key Stage 4 curriculum in 1996, therefore those attending school prior to this date may be limited in their computer literacy and consequently less likely to participate in the study. People of a lower socio-economic status may not have easy access to a computer, and therefore would be less likely to participate in the study. In addition, the sample size was relatively small due to the constraints of an undergraduate study, and an unequal range of ages was studied. There may be order effects, as the procedure followed was the same for all participants. Lastly, the observed significant relationships could in part be explained by method overlap, in that self-report measures predicted self-report measures.

The findings of this study imply that creative styles are undoubtedly significant, situating creativity as a complex construct. To elucidate these differing styles further and to assess how they are related to schizotypy, cognitive and personality traits should be considered (Gough and Helibrun, 1980; Claridge et al, 1998). Self-report measures of creativity should be used which appear to test both scientific and artistic creativity as they were both included in the present study, albeit in unequal numbers, whereas it can be seen that DT may be more exclusive in what it measures, e.g. only artistic creativity (Burch et al, 2006; Nettle, 2006). Research looking at the differences between convergent and divergent thinking in relation to schizotypy (Claridge and McDonald, 2009) suggested that cognitive and personality styles relate differently to negative and positive schizotypy. It was concluded that schizotypy should be revised to include all psychotic traits and relabelled ‘psychoticism’ akin to Claridge (2009). More research into creative styles, then, may enlighten the concept of schizotypy. Thus, in a broader sense, creative styles could be assessed in schizophrenic patients in relation to schizotypal traits to shed light on symptoms. Creative styles could also be used diagnostically and may have implications for therapeutic treatments.

In conclusion, this study has shown that self-reported measures are better correlated with schizotypy than DT tests and that self-reported creativity is positively associated with positive (UnEx) and asocial (ImpNon) schizotypy, and negatively associated to negative (IntAn) schizotypy. Despite these observed relationships, self-reported creativity did not account for much variance when examined individually. This suggests that other factors are involved and, as creativity styles (which relate to personality) have been recognised of importance, it seems variables such as this should be considered for future research. Additionally, the discussion of DT results shows that previously found ambivalence in DT scores relating to schizotypy is possibly because of differences in creative styles.
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