

## The Dark Side of Poor Adjustment: Personality Disorders and Trait Neuroticism

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### Abstract

This paper reports on two studies, with large adult populations, which examined “dark-side” correlates (subclinical Personality Disorders: PDs) of two established measures of Neuroticism (N). It aimed to examine the relationship between the PDs and trait N. In the first study, 5300 British adults completed the Adjustment scale of the Hogan Personality Inventory (HPI) as well as the Hogan Development Survey (HDS) which measures the Personality Disorders (PDs). Results showed that people who score high on Excitable (Borderline), Cautious (Avoidant) and Sceptical (Paranoid) had low Adjustment (high Neuroticism), though there were significant differences between the different facets scores. In the second study, 6700 British adults completed the NEO-PI-R Neuroticism Scale with five Domain and six facet scores as well as the HDS. Regressions on the Domain and Facet scores showed a similar pattern: people scoring high on Cautious (Avoidant) and to a lesser extent Excitable (Borderline) and Sceptical (Paranoid) had higher Neuroticism scores. Similarities and differences in the findings for the two studies are considered. Limitations are also discussed.

**Keywords:** Hogan Personality Inventory; Neuroticism; Dark-side

### Introduction

This paper considers the relation between the “dark-side” Personality Disorders (PDs) and different measures of trait Neuroticism (N) measured at the Domain and Facet level. The central question is which of the “dark-side” sub-clinical PDs are most and least related to the “bright-side” trait N, sometimes called adjustment or negative affectivity. Previous studies on this relationship using patients and students and using different measures have yielded contradictory results and few have empirical evidence at the finer-grained Facet level. These paper reports two studies with large, normal, adult populations but using two different well-established and psychometric measures of domain N, as well as its different Facets, but the same measure of the sub-clinical PDs devised to be used on normal, adult, populations [1]. There are very many measures designed to assess the PDs and this uses one extensively used in work psychology settings [2].

The aim of this study is three-fold: to contribute to the literature on the relationship between psychological conceptions of normal personality and psychiatric conceptions of mental illness; to indicate to those using “dark-side” measures in work settings for coaching, selection and training the extent to which these traits are linked to N; as well as look at the psychometric properties of the Hogan Development Survey, used in both studies as a measure of sub-clinical “dark-side” personality [1].

There have been various attempts to integrate ‘normal’ and ‘abnormal’ personality structure [3,4]. Widiger [5] indicated the hypothetical association between the possible 30 Facets of the well-established and accepted NEO-PI-R [6] and each of the PDs. This has however been updated by more recent meta-analyses and experimental studies. [7], using 15 independent samples, found five disorders relatively strongly related to N: Borderline, Avoidant, Dependent, Schizotypal and Paranoid [8], using 16 samples in their review, highlighted six PDs associated with N in rank order: Borderline (all six facets), Avoidant, Dependent, Paranoid, Schizotypal and Schizoid. The N facet that seemed most closely associated with the PDs was N3 Depressiveness and that least associated was N5 Impulsivity. The later review by De Fruyt et al. [9] looked at the hypothesised relationship between the PDS and the six N facets as specified by the NEO-PI-R. Agreement was clearest on Borderline PD followed by Avoidant PD. Two facets seemed little related to all the personality disorders namely N3

Depressiveness and N5 Impulsiveness, which is not consistent with NEO Personality Inventory and Five-Factor Inventory Professional Manual [8].

There are clearly differences in these studies at both the Domain and Facet level. Whilst nearly all suggest that Borderline, Avoidant and Dependent are high on N there is much disagreement about Schizoid and Narcissistic PD. This study was able to test various hypothesised relationships and replicate previous studies with two large normal adult samples and using two different measures of N, but a well-respected, validated, work-related measure of the core features of each PD.

### Measuring Sub-Clinical PDs: the HDS

The Hogan Development Survey (HDS) now extensively used in organisational research and practice to measure the core features of personality disorders in the ‘normal population’ [2,10-14]. Its aim is partly to help selectors and individuals themselves diagnose how they typically react under work stress. The HDS was explicitly based on the DSM-IV-TR Axis II Personality Disorder descriptions, but it was not developed for the assessment of all DSM-IV-TR disorders or those remaining in DSM V [15-17]. The HDS focuses only on the core construct of each disorder from a dimensional perspective [18]. The test has a higher order structure similar to the Cluster A, B and C in the PDs which are called Moving Away, Moving Against and Moving towards others (Table 1) shows how different writers have conceived of the PDs including the concepts used in the HDS system compared to the DSM system (Table 1).

Various relatively small scale studies have used the HDS and have shown it to be a robust, reliable and valid instrument [11,12,19].

### Neuroticism

The World Health Organisations International Classification of

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| DSM-IV Personality Disorder |   | Hogan & Hogan (1997) HDS Themes |  | Oldham & Morris (1991) | Miller (2008)         | Dotlich & Cairo (2003) |
|-----------------------------|---|---------------------------------|--|------------------------|-----------------------|------------------------|
| Paranoid                    | Distustful and suspicious of others; motives are interpreted as malevolent.   | Sceptical                       | Cynical, distrustful and doubting others' true intensions.   | Vigilant               | Vigilantes            | Habitual               |
| Schizoid                    | Emotional coldness and detachment from social relationships; indifferent to praise and criticism.   | Reserved                        | Aloof, detached and uncommunicative; lacking interest in or awareness of the feelings of others.                                       | Solitary               | Oddballs              | Aloof                  |
| Schizotypal                 | Odd beliefs or magical thinking; behaviour or speech that is odd, eccentric or peculiar.  | Imaginative                     | Acting and thinking in creative and sometimes odd or unusual ways.   | Idiosyncratic          | Creativity and vision | Eccentric              |
| Antisocial                  | Disregard for the truth; impulsivity and failure to plan ahead; failure to conform.   | Mischievous                     | Enjoying risk taking and testing the limits; needing excitement; manipulative, deceitful, cunning and exploitative.                    | Adventurous            | Predators             | Mischievous            |
| Borderline                  | Inappropriate anger; unstable and intense relationships alternating between idealisation and devaluation.   | Excitable                       | Moody and hard to please; intense but short-lived enthusiasm for people, projects or things.   | Mercurial              | Reactors              | Volatility             |
| Histrionic                  | Excessive emotionality and attention seeking; self dramatising, theatrical and exaggerated emotional expression.  | Colourful                       | Expressive, animated and dramatic; wanting to be noticed and needing to be the centre of attention.                                    | Dramatic               | Emoters               | Melodramtic            |
| Narcissistic                | Arrogant and haughty behaviours or attitudes, grandiose sense of self-importance and entitlement.   | Bold                            | Unusually self-confident; feelings of grandiosity and entitlement; over valuation of one's capabilities.                               | Self-Confidence        | Preeners              | Arrogance              |
| Avoidant                    | Social inhibition; feelings of inadequacy and hypersensitivity to criticism or rejection.   | Cautious                        | Reluctant to take risks for fear of being rejected or negatively evaluation.   | Sensitive              | Shrinkers             | Excessive Caution      |
| Dependent                   | Difficulty making everyday decisions without excessive advice and reassurance; difficulty expressing disagreement out of fear of loss of support or approval. | Dutiful                         | Eager to please and reliant on others for support and guidance; reluctant to take independent action or to go against popular opinion. | Devoted                | Clingers              | Eager to please        |
| Obsessive-Compulsive        | Preoccupations with orderliness; rules, perfectionism and control; over-Conscientiousness and inflexible.   | Diligent                        | Meticulous, precise and perfectionistic, inflexible about rules and procedures; critical of others; .                                  | Conscientious          | Detailers             | Perfectionistic        |
| Passive-Aggressive          | Passive resistance to adequate social and occupational performance; irritated when asked to do something he/she does not want to.                             | Leisurely                       | Independent; ignoring people's requests and becoming irritated or argumentative if they persist.                                       | Leisurely              | Spoilers              | Passive resistance     |

**Table 1:** Different labels for traits associated with similar disorders.

Diseases (ICD-10) uses N as a central organising principle considering the stress-related, somatoform and dissociative disorders, whilst N has been dropped from the DSM III manual onwards. The nature, diagnosis and treatment of N continue to be discussed [20,21]. It has long been recognised “a psychological trait of profound public health significance. Neuroticism is a robust correlate and predictor of many different mental and physical disorders, comorbidity among them, and the frequency of mental and general health services used [22].

In the ICD system N is most clearly described in three disorders: Generalised Anxiety, Panic and Phobic disorders. Specific phobias detailed to overlap with N includes Agoraphobia, Social Phobia, Obsessive Compulsive Disorder and Post-Traumatic stress disorder. In the DSM system, N was similarly associated with panic, social and generalised anxiety disorders, but not with the personality disorders.

Many higher order theories of personality - like the Eysenckian Giant Three, the Big Five, the six factor HEXACO model or the seven factor Hogan Personality Inventory - describe and measure Neuroticism at the Domain, but also at the Facet level, though there remains very little agreement in the description of these facets. For instance, the Eysenck Personality Profiler (EPP) has seven N facets labelled: Inferiority, Unhappiness, Anxiety, Dependence, Hypochondria and Obsessiveness the HEXACO model four facets labelled: Fearfulness, Anxiety, Dependence and Sentimentality as reported by Ashton and Lee in 2009; and the Multidimensional Personality Questionnaire (MPQ) has three facets labelled Stress Reaction, Alienation and Aggression [23]. Even the name of the domain changes: for the EPP it is Neuroticism, the HEXACO it is Emotionality and for the MPQ it is Negative Emotional Temperament. This indicates subtle but important differences in the conceptualisation of Neuroticism.

There are, furthermore, many debates as to the nature of Neuroticism such as the components of Neuroticism as well as the very nature of concept itself. Thus while Ruthann and Kolar [24] noted that there is “an abundance of studies have shown that neuroticism scores predict life stress, psychological distress, emotional disorders, psychotic symptoms, substance abuse, physical tension-related symptoms, medical unexplained physicals symptoms and health care utilisation”. Yet, they do not remain critical about the concept because there are few theories to explain the mechanisms or processes of the trait; nor is there much evidence about its neuro-biological substrates.

Nevertheless, N remains at the heart of all modern personality theories. Moreover, it has been shown that N is the most powerful Big-Five personality predictor of mental well-being [15], physical health [25,26]. People with high scores on N scales are prone to anxiety, depression and hypochondriasis which affect all aspects of their educational, social and work lives.

By using two different and well used measures of N at Domain and Facet level in this study it will be possible to compare correlated with PDs and understand what exactly the scales are measuring.

## Study 1

This study looks at the dark side (PD) correlates of the total score and facets of the HPI dimension Adjustment. There is one distinctive feature of the HPI conception of Adjustment in that it measures N by a Lack of Adjustment In this sense all items are phrased positively and N is seen as low adjustment. It has eight subscales that are modestly, but positively inter-correlated. Based on previous research and meta-analyses mentioned about it was predicted that three of the PDs would be strongly (negatively) associated with Adjustment (and Facets),

2A

|                    | Overall Adjustment         |       |        | Empathy                    |       |        | Not Anxious                |       |        | No Guilt                   |        |        | Calmness                 |       |        |
|--------------------|----------------------------|-------|--------|----------------------------|-------|--------|----------------------------|-------|--------|----------------------------|--------|--------|--------------------------|-------|--------|
|                    | r                          | Beta  | t      | r                          | Beta  | t      | r                          | Beta  | t      | r                          | Beta   | t      | r                        | Beta  | t      |
| Gender             | .002                       | .008  | 0.71   | -.006                      | -.007 | -0.50  | .008                       | .024  | 1.69   | -.005                      | 0.007  | 0.49   | -0.004                   | .030  | 2.04   |
| Age                | -.139                      | -.083 | -0.76  | -.008                      | -.012 | -0.87  | -.159                      | -.071 | -5.00  | -.034                      | 0.016  | 1.15   | -0.233                   | -.170 | -11.19 |
| Excitable          | -.698                      | -.561 | -45.25 | -.543                      | -.466 | -28.63 | -.461                      | -.353 | -21.30 | -.557                      | -0.413 | -26.25 | -0.372                   | -.311 | -17.98 |
| Sceptical          | -.397                      | -.130 | -10.23 | -.304                      | -.106 | -6.32  | -.143                      | .016  | 0.93   | -.264                      | -0.070 | -4.29  | -0.146                   | .015  | 0.86   |
| Cautious           | -.502                      | -.253 | -18.27 | -.306                      | -.122 | -6.71  | -.440                      | -.325 | -17.40 | -.419                      | -0.192 | -10.91 | -0.256                   | -.215 | -11.10 |
| Reserved           | -.271                      | -.004 | -0.34  | -.251                      | -.048 | -3.00  | -.091                      | .100  | 6.09   | -.188                      | 0.025  | 1.62   | -0.002                   | .098  | 5.78   |
| Leisure            | -.313                      | -.023 | -1.94  | -.212                      | -.008 | -0.53  | -.169                      | .008  | 0.48   | -.283                      | -0.073 | -4.78  | -0.132                   | .008  | 0.47   |
| Bold               | -.046                      | -.002 | -0.12  | -.078                      | -.034 | -1.93  | .012                       | -.061 | -3.40  | .048                       | 0.066  | 3.91   | -0.089                   | .004  | 0.23   |
| Mischievous        | -.060                      | -.008 | -0.59  | -.050                      | .017  | 1.01   | .088                       | .051  | 2.96   | -.019                      | -0.001 | -0.03  | -0.103                   | -.054 | -3.04  |
| Colourful          | .016                       | -.075 | -5.38  | -.020                      | -.089 | -4.85  | .066                       | -.057 | -3.02  | .056                       | -0.026 | -1.46  | -0.147                   | -.160 | -8.18  |
| Imagine            | -.192                      | -.076 | -6.19  | -.122                      | .007  | 0.42   | -.031                      | .002  | 0.11   | -.146                      | -0.106 | -6.83  | -0.204                   | -.111 | -6.50  |
| Diligent           | -.014                      | .013  | 1.19   | -.045                      | -.046 | -1.14  | -.032                      | -.013 | -0.88  | .014                       | 0.047  | 3.35   | 0.039                    | .034  | 2.20   |
| Dutiful            | -.126                      | -.003 | -0.26  | .022                       | .099  | 6.65   | -.158                      | -.011 | -0.72  | -.228                      | -1.21  | -8.36  | -0.081                   | -.006 | -0.35  |
| F Statistic        | F(13, 3485)=442.62; p<.001 |       |        | F(13, 3483)=143.77; p<.001 |       |        | F(13, 3482)=121.43; p<.001 |       |        | F(13, 3485)=171.70; p<.001 |        |        | F(13, 3484)=96.2; p<.001 |       |        |
| Adj R <sup>2</sup> | .621                       |       |        | .347                       |       |        | .309                       |       |        | .388                       |        |        | .261                     |       |        |

2B

|                    | Even Tempered              |        |        | No Complaints             |        |       | Trusting                   |        |        | Good Attachment           |        |       |
|--------------------|----------------------------|--------|--------|---------------------------|--------|-------|----------------------------|--------|--------|---------------------------|--------|-------|
|                    | r                          | Beta   | t      | r                         | Beta   | t     | r                          | Beta   | t      | r                         | Beta   | t     |
| Gender             | 0.007                      | 0.006  | 0.39   | 0.005                     | 0.032  | 2.04  | 0                          | 0.015  | 1.09   | 0.008                     | -0.043 | 2.66  |
| Age                | -0.084                     | -0.045 | -3.13  | -0.185                    | -0.136 | -8.6  | 0.022                      | 0.057  | 4.04   | -0.095                    | -0.087 | -5.27 |
| Excitable          | -0.572                     | -0.514 | -31.62 | -0.386                    | -0.314 | -17.5 | -0.301                     | -0.078 | -4.85  | -0.313                    | -0.234 | -12.5 |
| Sceptical          | -0.246                     | -0.081 | -3.46  | -0.132                    | 0.023  | 1.25  | -0.554                     | -0.436 | -26.36 | -0.171                    | -0.064 | -3.31 |
| Cautious           | -0.308                     | -0.112 | -6.16  | -0.314                    | -0.146 | -7.26 | -0.226                     | -0.051 | -2.83  | -0.183                    | -0.073 | -3.51 |
| Reserved           | -0.198                     | -0.039 | -2.43  | -0.137                    | -0.002 | -0.11 | -0.304                     | -0.122 | -7.8   | -0.138                    | -0.031 | -1.71 |
| Leisure            | -0.146                     | 0.052  | 3.31   | -0.183                    | -0.048 | -2.77 | -0.302                     | -0.069 | -4.4   | -0.118                    | 0.001  | 0.03  |
| Bold               | -0.024                     | -0.02  | -1.14  | 0.033                     | -0.01  | -0.5  | -0.118                     | 0      | 0.01   | -0.016                    | 0.044  | 2.19  |
| Mischievous        | -0.034                     | 0.002  | 0.12   | 0.011                     | -0.04  | -2.16 | -0.187                     | -0.094 | -5.65  | -0.049                    | 0.02   | 1.03  |
| Colourful          | -0.013                     | -0.077 | -4.21  | 0.076                     | 0.02   | 0.96  | 0.055                      | 0.075  | 4.12   | -0.026                    | -0.041 | -1.94 |
| Imagine            | -0.102                     | 0.001  | 0.09   | -0.045                    | -0.011 | -0.63 | -0.127                     | 0.019  | 1.22   | -0.177                    | -0.159 | -8.63 |
| Diligent           | 0.024                      | 0.014  | 0.96   | -0.002                    | 0.013  | 0.83  | -0.124                     | -0.034 | -2.38  | 0.048                     | 0.05   | 2.98  |
| Dutiful            | -0.069                     | -0.001 | -0.07  | -0.092                    | -0.013 | -0.81 | -0.043                     | -0.02  | -1.38  | 0.014                     | 0.041  | 2.36  |
| F Statistic        | F(13, 3485)=145.14; p<.001 |        |        | F(13, 3485)=68.87; p<.001 |        |       | F(13, 3482)=154.58; p<.001 |        |        | F(13, 3484)=44.11; p<.001 |        |       |
| Adj R <sup>2</sup> | 0.349                      |        |        | 0.201                     |        |       | 0.364                      |        |        | 0.138                     |        |       |

**Table 2:** Correlational and regression results for the HPI Adjustment Scale and its HICs. Low scores on adjustment indicates high neuroticism.

namely Borderline (Excitable), Avoidant (Cautious) and Dependent (Dutiful) while three would be essentially unrelated to Adjustment namely Narcissistic (Bold), Anti-Social (Mischievous) and Colourful (Histrionic). The study also looked at the higher order factor structure of the HDS which corresponds to Cluster A, B and C in the APA [27-30] system.

**Method and Participants**

In total 6957 British working adults took part in this study of which 1493 were females and 5464 males. Their mean age was 37.59 years (SD = 13.57 years) with the range being between 19 and 68 years. Most were graduates and in middle class occupations with English as their mother tongue. All were in full time work.

**Materials**

- Hogan Personality Inventory (HPI) [31,32] – This 206 items measure has two types of scales: seven personality traits and six criterion scores. The seven personality traits assessed are: adjustment, ambition, sociability, interpersonal sensitivity, prudence, inquisitive, learning approach. The Adjustment scale has 8 sub-scales:

**1. Empathy (5 items):** High scores indicate absence of irritability.

**2. Not anxious (4 items):** High scores indicate absence of anxiety.

**3. No Guilt (6 items):** High scores indicate an absence of regret, and worry about past mistakes.

**4. Calmness (4 items):** High scores indicate a lack of emotionality, and calmness in a crisis.

**5. Even-Tempered (5 items):** High scorers are not moody or temperamental

**6. No Complaints (5 items):** High scorers have a positive attitude and few complaints

**7. Trusting (3 items):** High scorers are not suspicious of others, or question their intentions.

**8. Good Attachment: (5 items):** High scorers show little hostility toward authority and have good family relationships.

- The alphas for all the scale over .80 and test-retest reliability varying between 0.69 and 0.87.

- Hogan Development Survey [29] consists of 154 items that are concerned with how the respondent typically interacts with family, friends and co-workers. There are 11 scales, each grouping 14 items. Respondents are requested to ‘agree’ or ‘disagree’ with the

| Component   | 1     | 2     | 3     |
|-------------|-------|-------|-------|
| Bold        | .759  | .002  | .142  |
| Mischievous | .734  | .046  | -.148 |
| Colourful   | .730  | -.277 | -.095 |
| Imaginative | .693  | .144  | -.017 |
| Excitable   | .037  | .731  | -.009 |
| Reserved    | -.128 | .707  | -.239 |
| Cautious    | -.328 | .696  | .277  |
| Leisurely   | .211  | .583  | .319  |
| Sceptical   | .447  | .579  | .113  |
| Diligent    | .057  | .005  | .729  |
| Dutiful     | -.149 | .081  | .724  |
| Eigenvalue  | 2.52  | 2.30  | 1.36  |
| Variance    | 22.98 | 20.91 | 12.32 |

**Table 3:** Varimax rotated factor analysis of the HDS.

items. Higher scores on the scales correspond to an increased risk on specific interpersonal problems in the workplace. The HDS has been cross-validated with the MMPI personality disorder scales as well as “normal traits” [12]. It is increasingly used to predict leadership and management failure [10]. The mean was 7.40 (SD 2.76) and the alpha for the scale was .71. All alphas were in the range of 0.60 to 0.80.

### Procedure

Participants were tested by a British based psychological consultancy. Each participant was given personal feedback on their score. They were nearly all employed as middle to senior managers in British companies. The anonymised data was stored by the organisation and made available to researchers. Everyone who completed the tests over an eight period was logged and included in the data set.

### Results

First, correlations between age, sex, the PDs, the Domain and facet scores were calculated. Then stage-wise regressions were computed: age and sex in the first block and then the eleven PDs (Table 2).

Table 2 shows the correlation and regression results for the final stage of the regression. In the regressions the first stage (with age and sex) never accounted for more than five percent of the variance. Most of the correlations were negative indicating that high scores on the Domain Adjustment and all of the Facets which were scored in the direction of high Adjustment and low N were associated with high scores on the dark-side personality disorders. Each regression was significant accounting for between thirteen and sixty two percent of the variance. Almost without exception for the nine regressions Excitable (Borderline) had the highest Beta, followed by Cautious (Avoidant) and Sceptical (Paranoid). There was a reasonable amount of variability in the regressions for the facets: for instance, for Low Anxious-Mischievous was associated with a positive not a negative score.

Seven of the dark side factors were clearly related to Adjustment: those who are Excitable, Cautious, Colourful, Sceptical and Reserved, but not leisurely, scored highest (Table 3).

Next the HDS eleven factors were subjected to a Varimax-rotated factor analysis, using the scree-test to determine the number of factors. A three-fold factor solution emerged which is consistent with many other studies using large and small data sets (2). The First factor was labelled Moving Against, the second Moving Away, and the third Moving towards Others. These are almost identical to the usual DSM-IV-R three-fold classification called Dramatic, Emotional and Erratic,

Odd and Eccentric, Anxious and Fearful. The regressions were then repeated, this time using the higher order factor scores.

Table 4 shows the results of the regressions for Domain Adjustment and the eight Facet Scores. The results were very consistent for the Second Factor: Moving Away from People. Beta weights were consistently high and negative especially for Domain Adjustment itself as well as Facets Even Tempered and Trusting. The results for Moving Against People showed that where the Beta >.10 it was negative indicating that it was negatively related particularly to Domain Adjustment as well as Facets Empathy, Calmness, Trusting and Good Attachment. Moving towards People seemed related most to being negatively associated with Non Anxious and No Guilt.

### Discussion

The results indicate that many of the PDs are positively associated with N at the Domain and Facet level as measured by the HPI. The correlational results suggest that six of the PDs are associated with N: Excitable (Borderline), Sceptical (Paranoid), Cautious (Avoidant), and Reserved (Schizoid), Leisurely (Passive-Aggressive) and to some extent, Dutiful (Dependent). It is interesting to note that all these factors load on the Moving Away from factor of the HDS which is equivalent to the Odd and Eccentric Classification of the DSM system. Some correlations were  $r > 0.50$  at both the Domain and Facet level. Equally some of the PDs seemed very weakly and inconsistently related to the PDS such as Bold (Narcissistic), Mischievous (Anti-Social), and Colourful (Histrionic). The pattern was much clearer when the higher order HDS factors were related to adjustment. The Moving Away from people factor was by far the clearest associate of N. Four of the HPI Facets namely Good Attachment, Calmness, No Complaints and Not Anxious seemed least related to the PDs. Overall the results suggest that some PDs are highly associated with trait N, despite the fact that many of the mental health classification systems only associated OCD or OCPD as a neurotic disorder.

### Study 2

This study looks at the dark side correlates of the NEO-PI-R trait Neuroticism and its six facets. It was assumed that at the Domain and Facet level N would be most associated with the Moving Away from people PDs. The NEO-PI-R conceptions of the Big Five traits are probably the most widely accepted and used in current personality research. Furthermore it has a social desirability scale which can be used to control for possible impression management and dissimulation.

### Participants

In total 5726 British working adults took part in this study of which 1213 were females and 4513 males. Their mean age was 42.36 years (SD = 7.12 years) with the range being between 23 and 65 years. They were nearly all (over 95%) graduates and in middle class occupations with English as their mother tongue.

### Questionnaire

#### Personality

The NEO Personality Inventory – Revised (NEO-PI-R; Costa & McCrae, 1992). This 240-item, non-timed questionnaire measures 30 primary personality traits (facets) and the underlying ‘Big Five’ personality factors (domains), i.e., Neuroticism, Extraversion, and Openness to Experience, Agreeableness and Conscientiousness. Items involve questions about typical behaviours or reactions, which are answered on a five-point Likert scale, ranging from ‘strongly disagree’



|                   | Adjustment                  |        | Empathy                     |        | Not Anxious                 |        | No Guilt                   |        | Calmness                    |        | Even Tempered               |        | No Complaints               |        | Trusting                    |        | Good Attachment            |        |
|-------------------|-----------------------------|--------|-----------------------------|--------|-----------------------------|--------|----------------------------|--------|-----------------------------|--------|-----------------------------|--------|-----------------------------|--------|-----------------------------|--------|----------------------------|--------|
|                   | Beta                        | t      | Beta                        | t      | Beta                        | t      | Beta                       | t      | Beta                        | t      | Beta                        | t      | Beta                        | t      | Beta                        | t      | Beta                       | t      |
| Age               | .010                        | 0.80   | -.004                       | -0.29  | .019                        | 1.22   | .008                       | 0.56   | .026                        | 1.64   | .011                        | 0.74   | .030                        | 1.88   | .031                        | 2.14   | -.043                      | -2.65  |
| Gender            | -.134                       | -10.57 | -.043                       | -2.83  | -.136                       | -8.68  | -.023                      | -1.53  | -.224                       | -13.97 | -.077                       | -4.99  | -.163                       | -10.21 | .077                        | 5.30   | -.108                      | -6.57  |
| Against           | -.107                       | -8.61  | -.110                       | -7.41  | .042                        | 2.72   | -.016                      | -1.07  | -.171                       | -10.83 | -.053                       | -3.52  | .012                        | 0.78   | -.177                       | -12.31 | -.101                      | -6.26  |
| Away              | -.658                       | -53.09 | -.482                       | -32.80 | -.377                       | -24.60 | -.511                      | -35.50 | -.263                       | -16.83 | -.452                       | -30.07 | -.351                       | -22.56 | -.496                       | -34.84 | -.284                      | -17.69 |
| Toward            | -.069                       | -5.56  | .006                        | 0.41   | -.129                       | -8.40  | -.127                      | -8.78  | -.026                       | -1.68  | .005                        | 0.32   | -.047                       | -3.03  | -.090                       | -6.28  | .057                       | 3.50   |
| F Statistic       | F(5, 3493) = 604.77; p<.001 |        | F(5, 3491) = 227.54; p<.001 |        | F(5, 3490) = 154.65; p<.001 |        | F(5, 3493) = 265.9; p<.001 |        | F(5, 3492) = 119.48; p<.001 |        | F(5, 3493) = 188.24; p<.001 |        | F(5, 3493) = 127.99; p<.001 |        | F(5, 3490) = 288.53; p<.001 |        | F(5, 3492) = 80.45; p<.001 |        |
| AdjR <sup>2</sup> | .46                         |        | .25                         |        | .18                         |        | .28                        |        | .15                         |        | .21                         |        | .15                         |        | .29                         |        | .10                        |        |

Table 4: Regression with the HPI adjustment scales as criterion variables and the HDS higher order factors as predictor variables.

|             | N                         |       |       | N1                         |       |       | N2                        |       |       | N3                         |       |       | N4                         |       |       | N5                        |       |       | N6                         |       |       |
|-------------|---------------------------|-------|-------|----------------------------|-------|-------|---------------------------|-------|-------|----------------------------|-------|-------|----------------------------|-------|-------|---------------------------|-------|-------|----------------------------|-------|-------|
|             | r                         | Beta  | t     | r                          | Beta  | t     | r                         | Beta  | t     | r                          | Beta  | t     | r                          | Beta  | t     | r                         | Beta  | t     | r                          | Beta  | t     |
| Gender      | .136                      | .063  | 5.44  | .128                       | .047  | 3.76  | .068                      | .037  | 2.72  | .090                       | .030  | 2.48  | .084                       | .025  | 2.11  | .112                      | .080  | 5.71  | .135                       | .062  | 4.92  |
| Age         | -.130                     | -.056 | -4.92 | -.108                      | -.039 | -3.19 | -.071                     | -.032 | -2.36 | -.094                      | -.030 | -2.48 | -.080                      | -.022 | -1.88 | -.124                     | -.092 | -6.62 | -.102                      | -.042 | -4.1  |
| SD          | .137                      | .056  | 4.81  | .119                       | .055  | 4.41  | .171                      | .077  | 5.66  | .138                       | .067  | 5.52  | .064                       | .017  | 1.40  | .035                      | -.018 | -1.25 | .080                       | .052  | 4.16  |
| Excitable   | .371                      | 0.18  | 15.71 | .283                       | .125  | 10.08 | .352                      | .226  | 16.72 | .324                       | .140  | 11.57 | .235                       | .064  | 5.40  | .190                      | .123  | 8.73  | .272                       | .129  | 10.25 |
| Sceptical   | .229                      | 0.15  | 11.46 | .178                       | .124  | 9.09  | .301                      | .246  | 16.64 | .193                       | .101  | 7.62  | .131                       | .059  | 4.55  | .124                      | .051  | 3.31  | .073                       | .050  | 3.64  |
| Cautious    | .559                      | .465  | 32.00 | .497                       | .406  | 26.00 | .255                      | .179  | 10.53 | .531                       | .432  | 28.52 | .591                       | .489  | 32.99 | .141                      | .177  | 9.99  | .487                       | .388  | 24.63 |
| Reserved    | .194                      | -0.04 | -2.65 | .125                       | -.089 | -6.33 | .137                      | .011  | 0.75  | .205                       | -.004 | -0.28 | .227                       | -.019 | -1.42 | .013                      | -.024 | -1.49 | .163                       | -.023 | -1.62 |
| Leisure     | .248                      | .028  | 2.27  | .213                       | .025  | 1.89  | .112                      | -.060 | -4.21 | .263                       | .072  | 5.66  | .257                       | .055  | 4.39  | .091                      | .014  | 0.90  | .165                       | .019  | 1.43  |
| Bold        | -.134                     | -.085 | -6.44 | -.126                      | -.058 | -4.05 | .022                      | -.023 | -1.49 | -.142                      | -.099 | -7.20 | -.144                      | .003  | .254  | 0.00                      | -.086 | -5.32 | -.234                      | -.143 | -9.96 |
| Mischievous | -.142                     | -.043 | -3.13 | -.200                      | -.083 | -5.66 | -.015                     | -.053 | -3.33 | -.146                      | -.048 | -3.39 | -.229                      | -.066 | -4.71 | 0.16                      | .126  | 7.53  | -.218                      | -.072 | -4.83 |
| Colourful   | -.182                     | .012  | 0.79  | -.199                      | -.033 | -2.06 | -.020                     | .052  | 2.98  | -.185                      | .009  | 0.57  | -.290                      | -.067 | -4.40 | 0.10                      | .096  | 5.27  | -.229                      | .006  | 0.34  |
| Imagine     | .005                      | .081  | 6.38  | -.034                      | .055  | 4.01  | .084                      | .060  | 4.01  | .018                       | .109  | 8.21  | -.122                      | -.006 | -.461 | 0.16                      | .122  | 7.85  | -.107                      | .012  | 0.86  |
| Diligent    | .083                      | -.026 | -2.20 | .155                       | .050  | 3.87  | .089                      | .011  | 0.82  | .087                       | -.009 | -0.71 | .124                       | .004  | .314  | -0.14                     | -.142 | -9.76 | .045                       | -.044 | -3.38 |
| Dutiful     | .257                      | -.114 | 9.46  | .263                       | .106  | 8.18  | .066                      | .024  | 1.67  | .244                       | .103  | 8.22  | .275                       | .109  | 8.85  | 0.05                      | .050  | 3.42  | .255                       | .118  | 9.04  |
| F Statistic | F(14,4732)=248.12; p<.001 |       |       | F(14, 4723)=170.32; p<.001 |       |       | F(14, 4723)=91.51; p<.001 |       |       | F(14, 4723)=202.28; p<.001 |       |       | F(14, 4723)=224.48; p<.001 |       |       | F(14, 4723)=57.15; p<.001 |       |       | F(14, 4723)=161.12; p<.001 |       |       |
| Adj R2      | .422                      |       |       | .334                       |       |       | .211                      |       |       | .373                       |       |       | .398                       |       |       | .142                      |       |       | .321                       |       |       |

Table 5: Correlational and regression results for the NEO-PI-R Neuroticism Scale and its facets.

to 'strongly agree'. The manual shows impressive indices of reliability and validity. There are six facets associated with Neuroticism:

- 1. N1 Anxiety:** Level of free floating anxiety
- 2. N2 Angry Hostility:** Tendency to experience anger and related states such as frustration and bitterness
- 3. N3 Depression:** Tendency to experience feelings of guilt, sadness, despondency and loneliness
- 4. N4 Self-Consciousness:** Shyness or social anxiety
- 5. N5 Impulsiveness:** Tendency to act on cravings and urges rather than reining them in and delaying gratification
- 6. N6 Vulnerability:** General susceptibility to stress. Hogan Development Survey [30].

### Procedure

Participants were tested by a different British based psychological consultancy. Again each participant was given feedback on their results. Stored anonymised data was made available to researchers.

### Results

A similar analysis was conducted as in the previous study and the results are shown in (Table 5). The social desirability scale from the HPI was used as the NEO-PI-R does not have such a measure. There were seven stepwise regressions, the first step being sex, age and social desirability, and the second being the 11 PDs from the HDS. The table

shows the results of the second step. In each case the first step failed to account for more than five percent of the variance. All were significant and accounted for between 14% and 42% of the variance. As expected there was a fairly consistent pattern across the regressions. First it indicated that females more than males, younger rather than older, and high vs. low social desirable responders scored higher on Domain N and its Facets (Table 5).

Table 5 shows correlations and regressions for Domain N and the six facets. The regression for Domain N indicated that the four highest Beta's were, in order: Cautious, Excitable, Dutiful and Sceptical. Most correlations and Beta Weights were positive and consistently high for four PDs Excitable, Sceptical, Reserved and Dutiful. However, correlations between three PDs namely Bold, Mischievous and Colourful were nearly always negative and significant across all seven analyses. There was some variability in the loadings of Reserved and Diligent across the various Facets. The N5 Facet Impulsivity seemed least related to the PDs while N4 Self Consciousness was most related to the PDS (Table 6).

Next the HDS eleven factors were subjected to a Varimax-rotated factor analysis (Table 6) again using the screen test to determine the number of factors extracted. A three-fold factor solution emerged which is consistent to many other studies. It was almost identical to that shown in (Table 4). The First factor was labelled Moving Against, the second Moving Away, and the third Moving towards Others. These are almost identical to the usual DSM-IV-R three fold classification called Dramatic, Emotional and Erratic, Odd and Eccentric, Anxious and Fearful.

| Component   | 1     | 2     | 3     |
|-------------|-------|-------|-------|
| Bold        | .728  | .003  | .115  |
| Mischievous | .725  | -.001 | -.227 |
| Colourful   | .722  | -.330 | -.100 |
| Imaginative | .673  | .052  | -.070 |
| Reserved    | -.228 | .716  | -.194 |
| Cautious    | -.377 | .658  | .260  |
| Leisure     | .158  | .607  | .299  |
| Sceptical   | .447  | .584  | .138  |
| Excitable   | -.015 | .547  | -.059 |
| Diligent    | .008  | .089  | .724  |
| Dutiful     | -.171 | -.024 | .709  |
| Eigenvalue  | 2.72  | 1.99  | 1.18  |
| Variance    | 24.68 | 18.07 | 10.67 |

**Table 6:** Results from a VARIMAX rotated factor analysis of the HDS Component.

|                   | N                           |        | N1                          |        | N2                          |       | N3                          |        | N4                          |        | N5                         |       | N6                          |        |
|-------------------|-----------------------------|--------|-----------------------------|--------|-----------------------------|-------|-----------------------------|--------|-----------------------------|--------|----------------------------|-------|-----------------------------|--------|
|                   | Beta                        | t      | Beta                        | t      | Beta                        | t     | Beta                        | t      | Beta                        | t      | Beta                       | t     | Beta                        | t      |
| Gender            | .111                        | 9.01   | .093                        | 7.22   | .063                        | 4.58  | .072                        | 5.72   | .065                        | 5.32   | .103                       | 7.19  | .099                        | 7.62   |
| Age               | -.055                       | -4.44  | -.033                       | -2.53  | -.029                       | -2.11 | -.026                       | -2.04  | -.020                       | -1.62  | -.100                      | -6.95 | -.045                       | -3.46  |
| Against           | -.154                       | -12.50 | -.184                       | -14.42 | .044                        | 3.20  | -.157                       | -12.47 | -.266                       | -21.74 | .130                       | 9.10  | -.286                       | -22.10 |
| Away              | .458                        | 37.42  | .362                        | 28.52  | .331                        | 24.30 | .442                        | 35.40  | .415                        | 34.19  | .155                       | 10.88 | .328                        | 25.45  |
| Toward            | .202                        | 16.55  | .265                        | 21.00  | .068                        | 5.02  | .201                        | 16.23  | .258                        | 21.38  | -.069                      | -4.88 | .162                        | 12.67  |
| F Statistic       | F(6, 4740) = 352.67; p<.001 |        | F(6, 4731) = 277.34; p<.001 |        | F(6, 4731) = 133.71; p<.001 |       | F(6, 4731) = 313.38; p<.001 |        | F(6, 4731) = 374.61; p<.001 |        | F(6, 4731) = 58.95; p<.001 |       | F(6, 4731) = 246.16; p<.001 |        |
| AdjR <sup>2</sup> | .31                         |        | .26                         |        | .14                         |       | .28                         |        | .32                         |        | .07                        |       | .24                         |        |

**Table 7:** Regressions with the NEO-PI-R Neuroticism scales as predictor variables and the HDS higher order factors as criterion variables.

The regressions were then repeated, this time using the higher order factors (Table 7) shows the regression with the three higher order HDS factors. All three factors were significant predictors at Domain and Facet level. The Moving Away from People factor was the most consistent and powerful correlate. The Moving Towards other People was also significant for four of the six Facets. The Moving against People factor was significant negative predictor on five analyses, but positive on two others, particularly N5 Impulsivity.

## Discussion

Three things stand out with these results. The first is that the results were fairly consistent across the facets with the distinction on N5 Impulsivity. It should be noted that in other personality conceptions (specifically the early Eysenckian model) impulsivity is located either in Extraversion (E) or Psychoticism (P). Indeed there is an interesting story in the development of the Eysenck model which showed how impulsivity items were psychometrically a better fit with P rather than E [28]. Second, once again it is Cautious, Excitable and Sceptical disorder that seems most closely related to N. Thirdly, that at least three PDs (Bold, Mischievous, Colourful) are negatively associated with N.

## Conclusion

The results of these two studies are broadly comparable and best seen when comparing Tables 4 and 7. First, they show that the higher order PDs account for around between 31 and 46 % of the variance in the two domains: Adjustment and N. There are some important differences in the facets which suggest that the HPI facet called Good Attachment and the NEO-PI-R facet called Impulsivity are less related to the PDs than, for instance, the HPI called Trusting and the NEO-PI-R facet called Self-Consciousness. This suggests that the PDs are, in general, more associated with N than previous suggested in mental health classification systems.

Next, it is interesting that it is not the Anxious and Fearful (Moving Toward People) factor that is most strongly associated with N, but rather the Odd and Eccentric (Moving Away from People). All the data points to three PDs being highly and consistently related to N. They are Cautious or Avoidant PD characterised by feelings of inadequacy and fear or rejection and may pick up the depression and negative affectivity in N; Excitable or Borderline PD characterised by instability and moodiness which picks up the anxiety component of N; Sceptical or Paranoid PD which picks up the threat component of N. Leisurely or Passive-Aggressive PD, dropped between DSM III and IV, was the fourth most closely related PD to N, possibly picking up the irritation and moodiness.

Third, there is some evidence that some PDs are little, or indeed negatively, associated with N (see the correlations of Bold, Mischievous and Colourful in Tables 2 and 5. This suggests that Narcissistic, Anti-Social and Histrionic PD is associated with self-confidence and emotional stability which indeed characterises their description. However it is possible that people with these disorders either under-report their N characteristics or else have less insight into their emotional life.

## Limitations

Like all studies this has limitations. We were restricted to self-report which has well known limitations and could inflate the associations. It would have been most desirable to have some observational or test data, particularly on the PDs to confirm these associations. Next, there is possibly important moderator and mediator variables, like education and social relationships, could help explain these findings and which were not assessed in this study.

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