

15FQ+

FIFTEEN FACTOR
QUESTIONNAIRE
Technical Manual



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THE SECOND EDITION OF THE 15FQ+

The 15FQ+ represents a revision and update of the Fifteen Factor Questionnaire (15FQ), which was first published by Psytech in 1992. The 15FQ was developed as an alternative to the 16PF® series of tests; measuring the personality dimensions that were first identified by Cattell (1946) and his colleagues. Along with the Adult Personality Inventory (API), developed by Samuel Krug and his colleagues (Krug, 1984), there are now a number of modern, reliable instruments which assess Cattell's model of personality in addition to the 16PF series of tests (IPAT Staff, 1986; Russell & Karol, 1994).

The second edition of the 15FQ (now renamed the 15FQ+) remains true to the original version of this test, which measured 15 of the core personality factors first identified by Cattell in 1946. However, by taking advantage of recent developments in psychometrics and information technology, Psytech have been able to produce a shorter, yet more robust measure of these primary personality factors. Most significantly, the 15FQ+ incorporates a number of recent psychometric innovations; making these developments widely available to test users. These innovations include the addition of a measure of Intellectance (Scale β), to replace the Intelligence scale (Factor B) of the 16PF, which was excluded from the 15FQ for theoretical and practical reasons.

Factor B was excluded from the 15FQ as it is now generally accepted that ability factors can only be reliably measured through the use of timed tests. As such, untimed personality tests like the 16PF are unable to assess intelligence with an acceptable degree of reliability and validity. As a result, the inclusion of reasoning items in untimed personality tests creates difficulties for test administration, interpretation and feedback. Therefore, in line with current theory, Factor B (Intelligence) has been reconstructed as the metacognitive personality variable Intellectance, as opposed to an ability factor, thus enabling the inclusion of this important factor in an untimed personality test.

Moreover, being mindful of the problems of response bias when using a personality test in an occupational setting, the 15FQ+ includes a number of dedicated and non-dedicated impression management scales (some of which are only available via the computer generated narrative report). As well as providing a dedicated Social Desirability scale (which is available for both the pencil and paper and

computer scored versions of the long form of the test), the 15FQ+ also includes non-dedicated Faking Good and Faking Bad scales (which are only available for the computer scored versions of the long form of this test). In addition, the 15FQ+ provides measures of central tendency and infrequency responding. The new Central Tendency scale assesses the possibility that respondents may have been indecisive when answering the questionnaire, or may have been reluctant to respond in an open and direct manner. The Infrequency scale identifies random or inattentive responding when completing the 15FQ+.

A final innovation that has been incorporated in the 15FQ+ is the inclusion of two criterion keyed scales assessing Work Attitude (Ones, Viswesvaran & Schmidt, 1993) and Emotional Intelligence (Goleman, 1996). These criterion keyed scales are calculated from the sub-set of 15FQ+ items that, through research, have been found to best predict well-validated measures of these important constructs. Most significantly, recent research has suggested that such criterion keyed personality scales may have greater predictive validity in occupational settings than factorially pure scales such as the 15FQ+ primary factors (Ones & Viswesvaran, 2001).

The main features of the 15FQ+ are:

1. Items have been written to avoid culture, sex and age bias.
2. Items have been written in simple, clear and concise business (European) English.
3. The questionnaire has been designed to be brief – comprising of 12 items per scale.
4. Items have been selected to maximise reliability, while maintaining the breadth of the original personality factors.
5. The questionnaire is available for both pencil and paper and computer (including online) administration. Moreover, for the pencil and paper version of the questionnaire, self-scoring answer sheets and computer readable answer sheets are available.
6. A short form of the test, comprising just six items per scale, is also available. The short form of the 15FQ+ has been developed for those situations where rapid test administration is more important than high reliability and validity.

THEORETICAL BACKGROUND TO THE 15FQ+

In 1946 Raymond B. Cattell published his now seminal book 'The Description and Measurement of Personality'. This book identified the three sources of data that can be used as a basis for constructing a comprehensive theory of personality. These data are obtained from objective tests, observer's ratings of behaviour and self-report questionnaires. Cattell respectively termed these three sources of data: test, or T-data; life, or L-data and questionnaire or Q-data. T-data consists of behaviour that can be directly observed and measured in experimentally controlled conditions. These include such things as: measures of the latency of visual after effects; the stroop effect; speed of reaction time; the startle response; EEG activity, etc. Q-data and L-data consist respectively of self-reports or other's reports of typical observed behaviour.

In addition, 'The Description and Measurement of Personality' contains an integrative review of the then extant research that had been conducted into human personality using these three sources of data. By combining this research review with the results of the extensive factor analytic studies that Cattell and his colleagues had undertaken, Cattell was able to map out the basic, or primary, personality factors that are needed to account for the complete sphere of human personality. Most importantly, in this regard, Cattell distinguished between surface traits, or observed syndromes of behaviour, and source traits; with the latter referring to the deep structure personality traits that can only be identified via factor analysis. For ease of reference, each of those source traits that had been identified by L-data were denoted by a letter of the alphabet, and those that could only be identified by Q-data were denoted by the letter 'Q' written with a subscript (e.g. Q₁).

The personality traits first identified in 'The Description and Measurement of Personality' were then revised on the basis of further research such that, for example, Factor K was dropped from the model and Factors D and J were excluded from adult measures of personality, as these latter factors were found only to exist reliably in adolescent and pre-adolescent samples.

Subsequent research indicated that the 15 primary personality factors first identified by Cattell (that is to say, Cattell's 16 personality factors minus intelligence) can be accounted for

by five broad second order factors (Tupes & Christal, 1961). This elegant second order, five factor, model of personality has more recently been popularised by the work of Costa & McCrae (1987). These second order personality factors have come to be known as the 'Big Five' personality factors (Goldberg, 1990); thereby distinguishing them from the primary, or core, personality factors that were originally identified by Cattell. In keeping with current practice, the 15FQ+ self-scoring answer sheet enables users to calculate these second order factors from the primary factor scores, and the computer generated narrative report automatically calculates these second order (global) factor scores.

It has been recognised for some time now that many of the personality tests that were developed in the 1940s, '50s and '60s, are not sufficiently reliable to be used for occupational selection and assessment (Barrett & Kline, 1982; Blinkhorn & Saville, 1982). To a significant extent, the apparent low reliability of these early personality measures is a reflection of advances in computer technology. Just as the sound quality of modern digital technology makes gramophones sound archaic so too, by comparison, do modern personality tests make older instruments appear to have poor psychometric properties. However, it should be remembered that the reliability of modern personality tests is due to the ease and speed with which psychometricians can now analyse large, multiple sets of data to identify those items that have the best properties. Such easy and rapid analysis of big item data-sets was not only impossible, but also unimaginable, for researchers working in the 1940s, or '50s.

However, while the development of reliable scales was emphasised when constructing the 15FQ+, the test's authors have at all times been careful to ensure that the test's scales assess the same broad, primary personality factors that were first identified by Cattell and his colleagues, rather than assessing the narrow surface traits that are associated with a number of modern multi-factorial personality tests. Thus the 15FQ+ scales consist of items which have been designed to assess broad, well researched source traits (Cattell, 1957), rather than consisting of narrow, highly homogeneous item sets.

The only factor whose definition has substantially altered, from those originally

proposed by Cattell, is Intelligence. As noted above, in line with modern thinking, this factor has been re-defined as the metacognitive personality variable intellectance (Hogan, 1986). Such meta-cognitive variables aim to assess cognitive style; namely, individual differences in how people approach cognitive tasks. The interpretation of this factor is described in detail on Page 15 of this manual. However, in brief, it can be defined as follows; 'a self-reported superior level of intellectual capacity, a preference for, and enjoyment of, complex

arguments and ideas. A self-reported superior level of: verbal ability; memory; abstract reasoning ability and numerical ability.' With this exception, however, all of the personality factors measured by the 15FQ+ have retained their original definitions from Cattell's early research. Thus, when interpreting 15FQ+ profiles, test users will be able to utilise the knowledge and interpretation skills that they have developed using other measures of these traits (e.g. the 16PF4, Cattell, Eber & Tatsuoka, 1970).

PERSONALITY AND OCCUPATIONAL PERFORMANCE

Extensive research, conducted over many years, has consistently demonstrated that between 10% to 30% of the variance in job performance is attributable to personality differences (Furnham, 2001). Both a person's career choice and their success in their chosen career, have been shown to be strongly influenced by personality factors (Lowman, 1996). Moreover, a person's potential for burnout, their trainability and subsequent job satisfaction, have all been shown to be strongly influenced by personality (George, 1996; Maslach, Schaufeli, & Leiter, 2001; Spencer & Spencer, 1993). Thus personality assessment forms a central part of most careers guidance and counselling programmes, with the aim of helping individuals maximise their potential by finding an optimal match between their personality and their choice of career.

As noted above, the relationship between job performance and personality has now been well documented (Hurtz & Donovan, 2000; Kroeck & Brown, 2004; Tett, Jackson, & Rothstein, 1991). In their comprehensive review of the research literature, Barrick and Mount (1991) reported 117 studies that demonstrated strong relationships between personality (as assessed by valid psychometric tests) and: job performance; the effectiveness of staff training; staff turnover and length of tenure; absenteeism and salary level, across a wide range of professional, managerial, sales, public service, skilled and semi-skilled jobs. These authors found that personality was a consistent and strong predictor of job performance, with more recent reviews of the literature having further confirmed these findings (e.g. Kroeck & Brown, 2004; Warr, Bartram, & Martin, 2005).

It is generally accepted that behaviours associated with successful job performance can be classified into two distinct categories; task performance behaviours and contextual performance behaviours (Arvey & Murphy, 1998; Chan, 2005). Task performance behaviours refer to an incumbent's ability to perform the specific range of activities that are directly related to the job requirements. These include the specific knowledge and skills that are required to perform the job effectively. These characteristics and skills are often assessed via: interview; by reviewing a person's curriculum vitae and references; through bio-data questionnaires; by assessment centre exercises or job sample tasks. For many jobs however, one of the most reliable and valid ways to assess a person's likely performance across a range of task relevant behaviours is through the use of personality tests (e.g. by assessing the social boldness of sales staff, the detail-consciousness of accounts staff, etc.).

Contextual performance behaviours, on the other hand, refer to 'extra-role' or peripheral behaviours that, while not being explicitly part of the job requirements, are nonetheless necessary for successful job performance. Examples of contextual performance behaviours include pro-social behaviour (i.e. the ability to develop trusting relationships with colleagues), loyalty, honesty and stress-tolerance. Although not explicitly part of the job requirements, contextual performance behaviours can often have a huge impact upon a person's effectiveness and on an organisation's working environment and ethos. As a result, assessing an applicant's likely contextual performance can be central to successful staff selection. Many contextual

performance behaviours, however, **cannot** be reliably assessed by interviews, application forms, bio-data questionnaires and assessment centre exercises. Rather, such characteristics can typically only be reliably assessed by personality

tests (Chan, 2005; Hilliard, 2001; Hurtz & Donovan, 2000; Kaufman & Borman, 2004; Henry et al., 1990; Wise, et al., 1990). Thus the use of personality tests can play a central role in most selection and assessment decisions.

DEVELOPMENT OF THE 15FQ+

The 12 items that assess each of the 16 factors measured by the 15FQ+ were developed and refined through a series of iterative data analyses (Kline, 1986).

1. An extensive literature review was undertaken to define each of Cattell's 15 Factors (excluding Intelligence). Test items for trialling, which captured the full breadth of the behavioural manifestations and dispositions of each trait, were then generated by a panel of psychologists experienced in personality test construction. Care was taken to ensure that these trial items reflected Cattell's definitions of each of the test's factors. All the trial items were written in business English that avoided culture and sex bias. Wherever possible existing 15FQ items that fulfilled the above criteria were used.
2. Data on the trial item set were collected alongside data on Form A of the 16PF4. These data were analysed to ensure that the 15FQ+ items occupied the same position in personality factor space as the factors measured by the 16PF4 (Form A).
3. Those items that were found to yield poor psychometric properties were removed and new items were constructed (following the guidelines noted above). Only those items that had acceptable item-total correlations, and correlated substantially higher with their target scale than with any other scale, were retained for inclusion in the final test.
4. Steps 2 and 3 were repeated iteratively until 12 items, that had acceptable psychometric properties, were obtained for each of the 15 (i.e. excluding the Intellectance [B] dimension and the Social Desirability scale) personality dimensions assessed by the 15FQ+.
5. Initial item sets for the Intellectance (B) and Social Desirability scales were generated by a panel of psychologists experienced in personality test construction. Step 3 was repeated iteratively until 12 items, that had acceptable psychometric properties, were obtained for each of these scales.
6. The 16 scales (including Intellectance) were then factor-analysed using the total standardisation sample, and five global factors similar to the 'Big Five' factors originally identified by Tupes & Christal (1961), were extracted.
7. Once a satisfactory final item set had been achieved, the Faking Good and Faking Bad, and the Work Attitude and Emotional Intelligence scales were constructed using criterion keying against well validated scales that assess these constructs. The Infrequency scale was constructed by selecting those responses (26) that were endorsed by 5% of respondents or less.
8. A short form of the 15FQ+ was then created by selecting the best six items from each item set for each of the 16 scales.

ADMINISTRATION, SCORING AND PROFILING

ADMINISTERING THE 15FQ+

The 15FQ+ can be administered in a pencil and paper, or computer (including internet based) format. In the computer administered format, instructions for test administration are automatically provided by the system. Detailed instructions for pencil and paper administration are provided in Appendix I.

While the 15FQ+ questionnaire booklet is designed to be virtually self-administerable, and contains detailed instructions on how to complete the test, respondents should **not** be left to self-administer the pencil and paper version of the test.

SCORING AND PROFILING THE 15FQ+

When the 15FQ+ questionnaire is computer administered, the test is automatically scored and profiled by the system. In the pencil and paper format there are two methods for scoring the test:

Hand Scoring A self-scoring answer sheet is available. By following the instructions in Appendix II the test administrator can obtain raw scores on the 16 primary personality factors, and the Social Desirability scale, and plot these directly on the adjacent sten profile chart, along with the global (or second order) factor scores. Scores for the Faking Good and Faking Bad Infrequency and Central Tendency scales are not available in the self-scoring pencil and paper format.

Computerised Scoring For those test users who have the software based test administration and scoring system, two further options for test scoring are available. Either item data can be entered on the appropriate screen, or alternatively, computer-readable answer sheets can be scanned. The software system will then automatically generate raw and sten scores for the 16 primary personality factors as well as the response style indicators, the criterion keyed scales and global factor scores.

Scoring the 15FQ+ involves converting the raw scores for each factor to standardised (sten) scores. Raw scores are standardised using a norm table that converts them into sten scores. This is done automatically by the software system.

For hand scoring, the test administrator can use the norm table that is built-into the profile chart. Raw scores are converted into sten scores by marking a cross on the appropriate raw score on the profile chart that corresponds to the sten score for that factor. (Alternatively, it is possible to refer to norm tables constructed from the user's own in-house norms, where available, in order to convert raw scores to sten scores.)

Once the profile chart has been completed, the next step in hand scoring the 15FQ+ involves calculating the global (or second order) factors. This is simply done by entering the appropriate sten scores (**not** raw scores) into each of the global factor equation boxes inside the self-scoring answer sheet, as described in the instructions in Appendix II, and then calculating the weighted total for each global factor.

STEN SCORES

Sten scores have a range 1 to 10, a mean of 5.5 and a standard deviation of 2. Sten scores of 5 or 6 are average, while scores of 4 or 7 are respectively slightly below, or slightly above, average; sometimes termed low-average and high-average respectively. Scores of 8, 9 and 10, can be considered to be high, very high and extremely high respectively, and similarly scores of 1, 2 and 3 can be considered to be extremely low, very low and low.

RISK SCALED SCORES

The Infrequency and Central Tendency scales are the only scales that are **not** reported using sten scores. This is due to these scales not being normally distributed. Rather, these scores are scaled according to the risk (probability) that a given score indicates that the profile is not valid. A risk scaled score of 8 or 9 indicates that the test user should consider the *possibility* that the profile may not be interpretable due to central tendency responding, or due to the respondent not having given due consideration and thought to the items when completing the test (i.e. due to infrequency responding). A score of 10 indicates that it is *likely* that the profile is not valid due to central tendency or infrequency responding.

PROFILE INTERPRETATION

IMPRESSION MANAGEMENT

The process of interpreting a 15FQ+ personality profile begins by reviewing the impression management scales. These scales provide important information about the validity of the personality profile, and thus the meaning of the profile should be interpreted in the context of these scales. The Social Desirability scale can be scored either using the self-scoring answer sheet/profile form, or the computerised scoring software. (The additional impression management scales, described below, are only available to those using GeneSys Assessment Software.) Unlike the additional impression management scales (described below) the Social Desirability scale is a dedicated scale that is independent of the primary personality factors (i.e. it is not comprised of items selected from the 16 primary factors). As such, it forms the test user's principal source of information about a person's response style.

Social Desirability Scale This scale assesses a person's desire to present an unrealistically positive image of themselves to others, with high scorers being motivated to deny the presence of the minor failings and idiosyncrasies that are typical of most people. Thus high scores on this scale (stems 8-10) may reflect *either* a deliberate attempt at distortion *or*, alternatively, a highly over-idealised (and possibly unrealistic) self-image. Therefore, before considering the likely impact of high scores on the validity of the test profile it is important to consider the candidate's motivation for responding in a socially desirable manner. Information elicited from the feedback session may be particularly useful in this regard. For example, individuals who are heavily engaged in charitable activities, or work of a self-sacrificing nature, may have higher than average scores on this scale. Similarly, people who have been brought up according to a very strict moral or religious code may be motivated to opt for more socially desirable responses to test items. Alternatively, if there are good grounds for considering that high scores are likely to reflect a deliberate attempt at distortion, then it is likely that the candidate will have under-reported their true scores on the Anxiety Global Factor, and the primary source traits that contribute to this global

factor; $\bar{f}C$, $\bar{f}O$ and $\bar{f}Q$. (Correlations between the Social Desirability scale and the primary personality factors are reported in Table 40). In addition, when the 15FQ+ questionnaire is being used for occupational assessment and selection, it is possible that respondents obtaining high scores on the Social Desirability scale may have either over, or under reported their scores on any other primary source traits that may be particularly job relevant.

Infrequency Scale This scale assesses the extent to which a respondent has attended diligently to the questionnaire and has avoided infrequent responses. Respondents who obtain high risk scaled scores (scores of 8-10) on this scale may not have given due thought and consideration to the items when completing the questionnaire *or* may not have diligently followed the questionnaire's instructions. When interpreting the significance of such scores assessors need to consider a number of factors. Given that attempts at sabotaging test results are rare in *most* occupational assessment settings, the first question which needs to be addressed is the possibility that the respondent did not fully understand the test instructions and/or items due to a poor command of formal written English. Once this possibility has been ruled out assessors should consider the scores the respondent has obtained on the other 15FQ+ scales, along with the characteristics of the assessment context. If the respondent has high scores on the Global Anxiety Factor, consideration should be given to the possibility that the respondent was so distressed during the assessment that he/she was unable to attend adequately to the questionnaire's instructions and/or items. If the Faking Bad scale is also high, such a pattern of test scores may possibly represent a 'cry for help' from a respondent who is having difficulty coping with the pressures of work. (Such an interpretation of the test's results is most likely to occur in an outplacement or performance review context.) The assessor should then consider possible reasons the respondent may have had for sabotaging the assessment by responding in a random or semi-random way to the questionnaire. Attempts at sabotaging an assessment are most likely to

have occurred if the respondent has been placed under pressure to complete the questionnaire unwillingly, in a redeployment or outplacement context.

Central Tendency Scale This scale assesses the degree to which respondents have been prepared to answer the questionnaire decisively - avoiding middle, or non-committal responses. High risk scaled scores (of 8 or 9) can suggest either that the respondent has a poorly defined self-concept, has been indecisive or reluctant to commit him or herself to particular attitudes or actions, *or* is genuinely moderate in respect to many personality traits and dispositions. (These competing interpretations of an elevated Central Tendency risk scaled score should be explored during the candidate feedback session, to facilitate the assessor's formulation of the most likely reason for this elevated score.) An extremely high risk scaled score (a score of 10) suggests that the personality profile is likely not to be valid, due to the respondent not having been willing to reveal very much about him or herself by seeking refuge in the middle, uncertain or in-between response. (Possible reasons why the respondent may have been reluctant to have revealed much about him or herself should be sought by considering the demand characteristics of the assessment context in greater detail.)

Faking Good This scale assesses a respondent's tendency to present him or herself in a favourable light, denying a variety of problem behaviours and difficulties that routinely apply to many people. If respondents obtain a high Faking Good score and a low Social Desirability score, then this score should be interpreted with caution as it may be elevated due to their scores on the primary factors that contribute to this scale, rather than reflecting an attempt to present a positive impression of themselves. In this situation the test user should interpret the elevated Faking Good score in the context of the person's overall personality profile, taking into account relevant information gained from the feedback session.

Faking Bad This scale assesses a respondent's tendency to present him or herself in an unfavourable light, admitting to a variety of problem behaviours and difficulties that do not routinely apply to him or herself. If the respondent is highly anxious or distressed then a high Faking Bad score should be interpreted with caution, as it may be elevated due to his or her scores on the primary factors that contribute to this scale, rather than reflecting an attempt to present a negative impression of him or herself. In this situation the test user should interpret the elevated Faking Bad score in the context of the person's overall personality profile, taking into account relevant information gained from the feedback session.

When interpreting the meaning of the impression management scales, the test user must give due consideration to the context in which the test was administered. Similarly, when interpreting the profile of a respondent who has obtained a high score on any of the impression management scales, the test user should use his or her knowledge about the demand characteristics of the assessment process to identify those personality factor scores that may have been distorted by the respondent's response set.

INTERPRETING THE GLOBAL FACTOR SCORES

The next step in interpreting the 15FQ+ profile is to review the global factor scale scores. These assess the 'Big Five' personality dimensions, about which much has been written (Costa & McCrae, 1987; Goldberg, 1990; Tupes & Crystal, 1961). The global factor scale names, as well as a brief description of their meanings, are presented on Page 11. When interpreting these factors, it should be noted that they provide a 'broad-brush approach' to describing the respondent's personality; indicating the respondent's general personality orientation. The respondent's scores on these dimensions thus provide the test user with an overall orientation to the respondent's character, and provide a basis for integrating the primary source traits within this 'broader picture'. When interpreting the meaning of these global personality factors, the test user should bear in mind that these global factor scores are calculated from the 16 source traits assessed by the 15FQ+.

When interpreting the global factor scores, the test user should examine whether each of

the primary source traits that contribute to that global factor are in the same direction as the global factor score. Thus, if the respondent has a high Extraversion Global Factor score, and has above average scores on each of the primary source traits that contribute to this global factor (fA , fF , fH and fQ_2), then it is likely that the respondent will act in a consistently extraverted manner. If, however, the respondent has low scores on any of the primary source traits that contribute to the Extraversion Global Factor, then it should be noted that the respondent is unlikely to have all the characteristics of a typical extravert. For example, if the respondent has a low score on Factor fA , they may lack warmth, empathy and interest in others, while still having a broadly extraverted personality. Similarly, if they have a low score on Factor fH , they may be lacking in social boldness and social presence and be somewhat slower than a typical extravert to come forward in social settings. However, they are still likely to be interested in people, to be sociable, friendly outgoing and fun-loving.

DEFINITIONS OF GLOBAL FACTORS

E**Extraversion**

Orientated to the outer world of people, events and external activities. Needing social contact and external stimulation.

 $\beta A+, \beta F+, \beta H+, \beta Q_2-$
Introversion

Orientated towards their own inner world of thoughts, perceptions and experiences. Not requiring much social contact and external stimulation.

 $\beta A-, \beta F-, \beta H-, \beta Q_2+$
N**Low anxiety**

Well adjusted, calm, resilient, and able to cope with emotionally demanding situations.

 $\beta C+, \beta L-, \beta O-, \beta Q_4-$
High anxiety

Vulnerable, touchy, sensitive, prone to mood swings, challenged by emotionally gruelling situations.

 $\beta C-, \beta L+, \beta O+, \beta Q_4+$
O**Pragmatism**

Influenced more by hard facts and tangible evidence than subjective experiences. May not be open to new ideas, and may be insensitive to subtleties and possibilities.

 $\beta A-, \beta I-, \beta M-, \beta Q_1-$
Openness (to experience)

Influenced more by ideas, feelings and sensations than tangible evidence and hard facts. Open to possibilities and subjective experiences.

 $\beta A+, \beta I+, \beta M+, \beta Q_1+$
A**Independence**

Self-determined with regard to own thoughts and actions. Independent minded. May be intractable, strong-willed and confrontational.

 $\beta+, \beta E+, \beta L+, \beta Q_1+$
Agreeableness

Agreeable, tolerant and obliging. Neither stubborn, disagreeable nor opinionated. Is likely to be happy to compromise.

 $\beta-, \beta E-, \beta L-, \beta Q_1-$
C**Low self-control**

Exhibiting low levels of self-control and restraint. Not influenced by social norms and internalised parental expectations.

 $\beta G-, \beta N-, \beta Q_3-$
High self-control

Exhibiting high levels of self-control. Influenced by social norms and internalised parental expectations.

 $\beta G+, \beta N+, \beta Q_3+$

INTERPRETING THE 16 PRIMARY FACTOR SCORES

Once the global factor scores have been interpreted, then the test user should start considering the significance of the primary source traits.

As stated earlier, the 15FQ+ source traits were originally discovered using factor analysis. The factor analytic method that was adopted by Cattell and his colleagues assumed that these primary personality factors would be correlated with each other. Hence, a number of different primary factors contribute to each global factor. As a result the 15FQ+ user can expect these primary personality factors to be associated with each other in a consistent manner. Thus the test user would expect a respondent who scores highly on Factor $\mathcal{F}A$ (Empathic), also to score highly on Factors $\mathcal{F}F$ (Enthusiastic) and $\mathcal{F}H$ (Socially-bold) and low on $\mathcal{F}Q_2$ (Group-Orientated); as each of these primaries contributes to the Extraversion Global Factor.

While this may often be the case, a cursory glance at the primary factor scores might suggest that there are inconsistencies in the personality profile. For example, a respondent might be high on Factor $\mathcal{F}E$ (Dominance) but low on Factor $\mathcal{F}H$ (Social Boldness). However such a profile is not inconsistent, as the meaning of such a profile should be interpreted in terms of the respondent's broader personality dynamics. This is where the richness of the 15FQ+ model starts to become apparent. For example, if the respondent were also to have a high score on Factor $\mathcal{F}L$ (Suspiciousness) – in addition to their high Factor $\mathcal{F}E$ and low Factor $\mathcal{F}H$ scores – then this would suggest that they are likely to be resentful and hostile towards others, as they will wish to assert themselves and control others, but will have difficulty doing so due to their lack of Social Boldness. Alternatively, if such a respondent had a high score on Factor $\mathcal{F}Q_1$, then it is likely that they will bottle up their desire to control situations (due to their low Factor $\mathcal{F}H$ score), but occasionally let this frustration out in uncontrolled bursts of anger.

When interpreting 15FQ+ profiles, it is important that the test user treat the initial report as a series of hypothesis that need corroboration through other sources of evidence, ideally obtained from a feedback session with the respondent.

The factor definitions on the following pages give a description of the meanings of high and low scores on each primary factor.

They also provide a guide as to how high and low scorers generally see themselves. The extent to which an individual exhibits all or some of the behaviours associated with each trait will depend on how high or low his or her scores are on a particular factor, and the extent to which that factor is influenced by the other traits measured by the 15FQ+.

An average score on a scale indicates that the respondent is likely to exhibit some of the behaviour patterns associated with both scale extremes.

INTERPRETING THE CRITERION SCORES

To help test users further consider the implications that a respondent's 15FQ+ profile has for that person's likely behaviour in the work place, the GeneSys Assessment Software provides scores for a variety of derived criterion scales. These include criterion scores for: Team Roles; Career Themes; Leadership Styles and Subordinate Styles. (While the reports produced by GeneSys provide a brief description of these criterion scores, a more detailed treatment of these concepts can be found, respectively, in the following sources; Belbin (2003), Holland (1985) and Bass (1985).

All the criterion scores produced by the GeneSys Assessment Software have been derived logically, with reference to the published literature which links the 16 primary source traits to these criteria. No cut-off scores are provided for these criterion scores. Rather, the test user should consider these criterion scores to be hypotheses about the respondent's likely work based behaviour, which should be tested with reference to the 15FQ+ profile and other sources of information. Most importantly, these criterion scores are intended as an aid to facilitate profile interpretation. That is to say, considering the respondent's 15FQ+ profile in the light of the highest and lowest obtained criterion scores, and examining the ways in which the profile is consistent and inconsistent with the criterion scores, is designed to add further useful insight into the candidate's character and most likely work place behaviour.

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FACTOR f_A

Distant Aloof, Lacking empathy, Distant,
Detached, Impersonal

Empathic, Friendly, Personable, Participating,
Warm-hearted, Caring

Low scorers tend to be cool, distant and somewhat aloof in their interpersonal relationships. They are disinclined to express their feelings and may feel somewhat uncomfortable with people who are overly friendly or familiar. Being extremely private individuals, they are likely to relate to others in an impersonal manner and may be seen as being somewhat detached and distant by all but their closest friends. They are likely to have difficulty understanding other's feelings, and may be viewed as lacking in empathy and warmth. They dislike talking about personal matters and will be slow to express sympathy or understanding for other's personal problems. Having a low need for affiliation, they are inclined to be slow to form close, warm relationships and emotional attachments to others.

High scorers are friendly, warm, participating individuals who are interested in the people around them and have a natural understanding of 'what makes others tick'. Quick to offer support and encouragement to friends and colleagues, they will be viewed as good listeners. Their interest in other people means they are likely to remember personal details about the people they meet, and be generous in interpersonal relationships. Their natural understanding and empathy for other's feelings means they will be seen as sympathetic, concerned, caring individuals. Warm-hearted and attentive to the needs of others, they are likely to be valued team members. Expressing their feelings in a genuine, heartfelt manner, they will have a friendly, personable interpersonal style.

Low scorers say:

People rarely confide in them. They are not quick to offer sympathy and encouragement to friends and colleagues. They find it difficult to relate to other's feelings.

High scorers say:

People often confide in them. They often phone friends for a chat. They find it rewarding to help others. They enjoy buying presents for other people.

Correlations with other factors: Factor f_A contributes to the Extraversion Global Factor, along with the other primary factors; Enthusiastic (f_F), Socially Bold (f_H) and Group-orientated (-ve f_Q_2). This reflects the fact that high f_A scores (Empathic) are associated with an interest in, and a desire to seek closeness with, other people. Factor f_A also correlates negatively with Factor f_I (Tender-minded), indicating that low Factor f_A (Distant Aloof) scores are often associated with a tough, unsentimental, utilitarian interpersonal style.

Correlation with other tests' scales

NEO: warmth 0.45, tendermindedness 0.45

JTI: EI -0.52, TF 0.53

OPPro: Gregarious 0.44, Trusting 0.35

OPQ: Behavioural 0.33, Affiliative 0.30

PPQ: Tender 0.57

EPQR: Empathy-Sensitivity 0.58

Bar-on: Empathy 0.66, Emotional Self-Awareness

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INTELLECTANCE β

Low Intellectance, Lacking confidence in one's own intellectual abilities

Low scorers are likely to lack confidence in their own intellectual abilities. As a result they may be disinclined to work on intellectually demanding tasks, which they may be prone to view as being 'beyond them'. They are inclined to view themselves as not having a particularly large vocabulary, and as lacking a broad range of general knowledge. Thus, they tend to avoid discussing issues which they may consider to be 'high brow'. They may feel uncomfortable in situations where they have to explain complex ideas to others, possibly feeling somewhat 'out of their depth'.

High Intellectance, Confident of one's own intellectual abilities

High scorers are confident of their own intellectual ability. As a result they are likely to enjoy working on tasks that are intellectually demanding and challenging. Intellectually orientated, they will generally be keen to learn new information and acquire new intellectual skills. They may be quick to take advantage of situations in which they can display their knowledge and intellectual prowess. As a result they may be prone to use long words and talk about intricate, intellectual matters. Moreover, they are likely to enjoy explaining complex ideas and problems to others.

Note: Scores on Intellectance Scale β should be interpreted with reference to a respondent's reasoning ability – as assessed by timed reasoning tests.

Low scorers say:

They do not enjoy working on complex, intellectually demanding tasks. They find it confusing when people use long words. It takes them a while to appreciate the key points in complex arguments.

High scorers say:

They have a good vocabulary and a good level of general knowledge. Other people often ask them to explain things to them. They learn new things more quickly than most people.

Correlations with other factors: Factor β (Intellectance) contributes to the Independence Global Factor, along with the other primary factors; Dominant (βE), Suspicious (βL) and Radical (βQ_1). This reflects the fact that high Factor β (Intellectance) scores are associated with an independent minded self-assurance. Intellectance (Factor β) also correlates modestly with Factor βE (Dominant) and Factor βO (Confident). This indicates that low Factor β (Intellectance) scores are associated with a lack of confidence in one's own intellectual abilities.

Correlation with other tests' scales

NEO: Competence 0.52, Assertiveness 0.50, Modesty -0.41
 OPQ: Worrying -0.43, Modest -0.34
 OPPro: Assertive 0.30
 EPQR: Venturesomeness 0.40, Neuroticism -0.035
 PPQ: Insecure -0.38

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FACTOR f_C

Affected by Feelings, Emotional, Changeable,
Labile, Moody

Emotionally Stable, Mature, Calm, Phlegmatic

Low scorers are inclined to experience mood swings. Lacking emotional resilience, they may at times have difficulty summoning up sufficient energy to face demanding situations. Being prone to experiencing anxiety symptoms, they may find themselves being troubled by sleep problems, psychosomatic symptoms, phobias, etc. Moreover, they may occasionally find themselves bothered by feelings of despondency or even depression. They may sometimes 'over-react' to situations, with their judgement being clouded by their strong emotional reactions. They are likely to be changeable, and may be viewed as being fickle, moody or capricious. However their emotional temperament may also be a source of drive, spurring them on to resolve situations they are unhappy with, or which they find unsatisfactory or unrewarding.

High scorers are likely to be emotionally stable, steady, resilient individuals. They rarely experience anxiety symptoms and are likely to have more than sufficient energy to meet life's challenges. Phlegmatic and inclined to 'take most things in their stride', they will rarely be ruffled by life's ups and downs. As such they are unlikely to experience feelings of depression or despondency. However, as a result, they may be viewed as somewhat lacking in emotion, drive or passion. They tend to be confident and secure in themselves and satisfied with their life and their achievements. Sometimes this may prompt them to become complacent, or overly accepting of unsatisfactory situations. Others are likely to view them as being mature, dependable individuals who can be relied upon to cope in a crisis.

Low scorers say:

They are often troubled by feelings of boredom, lethargy and tiredness. From time to time they experience a variety of anxiety symptoms and/or minor health worries.

High scorers say:

They rarely experience mood swings. They wake feeling refreshed, looking forward to the new day. They experience few anxiety symptoms.

Correlations with other factors: Factor f_C contributes to the Anxiety Global Factor, along with the other primary factors; Self-doubting (f_O), Tense-driven (f_Q) and Suspicious (f_L). This reflects the fact that low f_C scores (Affected by Feelings) are associated with high levels of anxiety, tension and threat sensitivity. Factor f_C also correlates modestly with Factor f_H (Socially-bold), indicating that high Factor f_C (Emotionally Stable) scores are associated with a tendency to feel confident in social settings and not worry about the impression one creates.

Correlation with other tests' scales

NEO: Anxiety -0.69, Depression -0.69, Vulnerability -0.60

OPPro: Phlegmatic 0.64

OPQ: Worrying -0.43, Relaxed 0.40

PPQ: Insecure -0.52

EPQR: Neuroticism -0.58

Bar-on: Self Regard 0.52, Stress Tolerance 0.47, Reality Testing 0.42

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FACTOR fE

Accommodating, Passive, Mild, Humble, Deferential

Co-operative, accommodating and obliging, low scorers are inclined to give way to others. Passive and unassuming, they will be keen to avoid upsetting friends and colleagues. As a result they may have difficulty when called upon to take charge of situations and give orders. Self-effacing, humble and mild-mannered, they are likely to be modest and deferential in their inter-personal relationships. They may lack aggression and be inclined to be passive and overly compliant when dealing with more assertive, self-assured individuals. Quick to acquiesce to other's wishes, they may have difficulty 'standing their ground' and asserting their own views and opinions when faced with active disagreement from others. They dislike conflict, arguments and discord, which they are likely to avoid at all costs; even if this means ignoring their own personal needs and goals.

Low scorers say:

They dislike taking the lead and telling people what to do. They try not to force their opinions on others. They try to avoid disagreeing with other people.

Dominant, Assertive, Competitive, Aggressive, Forceful

Determined to get their own way, high scorers may on occasion be aggressively assertive and pushy when dealing with others. Forceful, and vocal in expressing their opinions, they may be seen as opinionated or even somewhat dogmatic. Not being unduly concerned about upsetting people, they may be disinclined to listen to other's points of view. As a result they may have difficulty compromising, and conceding when others have a valid point. On occasion they may 'ride roughshod' over less assertive colleagues, alienating people who do not agree with them. Feeling free to criticise others, they may generate conflict and discord in those around them. They will be happy to take charge of a situation, and give clear instructions and orders, but may be overly controlling and domineering with colleagues who are less assertive and forceful.

High scorers say:

They are not afraid of upsetting people. They will freely complain about the quality of a service. They can be tough and sharp with people when needed.

Correlations with other factors: Factor fE contributes to the Independence Global Factor, along with the other primary factors; Intellectance (B), Suspicious (fL) and Radical (fQ_i). This reflects the fact that high fE scores (Dominant) are associated with an independent minded, direct and determined interpersonal style. Factor fE also correlates negatively with Factor fO (Self-doubting), indicating that low Factor fE (Accommodating) scores are often associated with a lack of social confidence and a tendency to worry about how others may view one.

Correlation with other tests' scales

NEO: Assertiveness 0.69, Modesty -0.60, Compliance -0.55

OPPro: Assertive 0.65, Persuasive 0.56

OPQ: Outspoken 0.57, Controlling 0.51, Modest -0.49

PPQ: Extraversion 0.30, Tender -0.39

EPQR: Psychoticism 0.40, Venturesomeness 0.38

Bar-On: Assertiveness 0.53, Independence 0.48

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FACTOR $\mathbb{F}$

Sober Serious, Restrained, Taciturn, Cautious

Enthusiastic, Lively, Cheerful, Happy-go-lucky, Carefree

Low scorers are restrained individuals whom others may view as being rather dour and lacking in a sense of fun. Serious minded, and somewhat inhibited, they are disinclined to attend lively social events and parties. They are inclined to be restrained and to avoid participating actively in social events. This may cause others to view them as being somewhat taciturn or saturnine. They have little time for light-hearted trivial entertainment, preferring instead to engage in more serious-minded activities. They find it difficult to 'let their hair down' and have a good time. Lacking a sense of playful fun, and *joie de vivre*, they may appear somewhat constricted or stiff in social situations. They are likely to have fewer friends than many people, and it may take others a while to warm to them.

High scorers are lively, talkative individuals who enjoy 'letting themselves go' and 'having a good time'. Always 'game for a laugh', they will be keen to take part in any activity that promises fun, thrills and excitement. Drawn to stimulating social situations, they may on occasion act in a somewhat attention seeking manner. Moreover their sense of fun, and effervescent, carefree character, may cause them on occasion to step beyond the bounds of decorum. Light-hearted, cheerful, easy-going individuals, people are likely to view them as being 'young at heart' and carefree. Actively seeking excitement and stimulation, they are quick to act, and enjoy 'getting stuck into things'. Happy-go-lucky and fun-loving, others are likely to appreciate their enthusiasm for life and their *joie de vivre*.

Low scorers say:

They dislike loud music and large, noisy parties. They prefer quiet pastimes and hobbies. They tend not to drop in unexpectedly on friends.

High scorers say:

They regularly go out with the express intention of having fun. They are lively, talkative, fun-loving individuals. They like to be surrounded by people.

Correlations with other factors: Factor $\mathbb{F}$ contributes to the Extraversion Global Factor, along with the other primary factors; Socially-bold ($\mathbb{H}$), Group-orientated (-ve $\mathbb{Q}_2$) and Empathic ($\mathbb{A}$). This reflects the fact that high $\mathbb{F}$ scores (Enthusiastic) are associated with a desire to have fun, and actively participate in social and group activities. Factor $\mathbb{F}$ also correlates negatively with Factor $\mathbb{N}$ (Restrained), indicating that low Factor $\mathbb{F}$ (Sober-serious) scores are often associated with a socially restrained, diplomatic reserve.

Correlation with other tests' scales

NEO: Gregarious 0.63, Positive Emotions 0.45, Excitement 0.41

JTI: EI 0.68

OPPro: Gregarious 0.47

OPQ: Outgoing 0.51, Affiliative 0.50, Conventional -0.48

MBTI: Introversion -.86, Extraversion 0.66

PPQ: Extraversion 0.51

EPQR: Extraversion 0.71

Bar-On: Happiness 0.41

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FACTOR f^fG

Expedient, Spontaneous, Disregarding of rules and obligations

Low scorers tend to lack a strong sense of duty, and may have difficulty persevering with boring or repetitive tasks. They are inclined to disregard well-established rules and set procedures and systems, which they may view as stifling creativity and spontaneity. Thus they may be inclined to be somewhat careless when attending to detail. They generally approach tasks in an expedient, casual manner, preferring to solve problems as they arise rather than follow a detailed action plan or schedule. They may be untidy and possibly somewhat disorganised, or even a little chaotic, in both their home and work life. Flexible and spontaneous, they are inclined to view things 'from the broader perspective'. They are likely to prefer thinking strategically, rather than being responsible for creating detailed plans and work schedules.

Low scorers say:

They are not particularly tidy or neat. They rarely double check things. They do not enjoy making detailed plans. They often misplace things.

Conscientious, Persevering, Dutiful, Detail-conscious

High scorers have a strong sense of duty and responsibility. They are persevering and are inclined to be neat, tidy and well organised. They are likely to set high standards both for themselves and for others. They believe it is important to be detail-conscious, precise and exacting in their work. On occasion they may be somewhat obsessive, perfectionistic or rigid. Thus they may be prone to obsessive-compulsive symptoms (e.g. repeatedly checking or counting the same thing, etc.). Meticulous and systematic in their work, they will be keen to make sure that things are done 'just right'. As a result they may find that others do not always live up to their own high standards. They may have difficulty viewing things from 'the broader perspective', and on occasion 'may not see the wood for the trees.'

High scorers say:

They are systematic and orderly in their work. They can be perfectionistic. They dislike working in untidy surroundings. They like to have a routine to follow.

Correlations with other factors: Factor f^fG contributes to the self-Control Global Factor, along with the other primary factors; Restrained (f^fN) and Self-disciplined (f^fQ_3). This reflects the fact that high f^fG scores (Conscientious) are associated with responsibility, an attention to detail and a preference for following established procedures and routines. Factor f^fG also correlates negatively with Factor f^fM (Abstract), indicating that low Factor f^fG (Expedient) scores are associated with a spontaneous, flexible openness and a tendency to view things from the broader perspective.

Correlation with other tests' scales

NEO: Order 0.75, Achievement 0.44

JTI: JP -0.78

OPPro: Flexible -0.57

OPQ: Detail Conscious 0.48, Variety Seeking -0.43, Conventional 0.36

MBTI: Judging 0.52, Perceiving -0.69

PPQ: Conscientiousness 0.52

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FACTOR f^H

Retiring, Timid, Socially anxious, Hesitant in social settings, Shy

Shy and retiring, low scorers may be slow to come forward in social situations. They do not find it easy to start conversations with strangers, and as a result it may take others a while to get to know them. If they suddenly and unexpectedly become the focus of attention at a social gathering they may find themselves feeling uncomfortable or self-conscious. They may be prone to feelings of 'stage fright', and are likely to be slow to speak up and express their views and opinions in front of people they do not know well. At parties and social events they may find themselves slipping into the background. They may feel ill at ease and self-conscious if they have to speak in front of a large group of people. In group situations they may be inclined to 'take a back seat' and let others do the talking.

Low scorers say:

They feel uncomfortable around strangers. They dislike speaking in public. It takes them a while to get to know new people. They tend not to 'speak up' in meetings.

Socially-bold, Venturesome, Talkative, Socially confident

Quick to come to the fore in social settings, high scorers will be seen as venturesome, socially bold individuals. They feel self-assured and confident in most social settings and are likely to be happy speaking in front of a large audience. In fact, they may actively seek out roles that place them 'in the limelight' and give them an opportunity to 'perform on the social stage'. Quick to initiate social contacts, they are good conversationalists who enjoy meeting new people. Whatever the setting, they usually have something to say, and readily contribute to group discussions and debates. They are likely to be good at 'making small talk' and bringing 'others out of their shell'. Natural, easy communicators, they are likely to make a big impression on the people they meet.

High scorers say:

They enjoy meeting new people. They find it easy to start conversations with strangers. They would enjoy 'going on the stage'. They are quick to express their opinions.

Correlations with other factors: Factor f^H contributes to the Extraversion Global Factor, along with the other primary factors; Enthusiastic (f^F), Group-orientated (-ve f^Q_2) and Empathic (f^A). This reflects the fact that high f^H scores are associated with a tendency to participate in social and group activities in a lively, enthusiastic manner. Factor f^H also correlates negatively with Factor f^E (Dominant), indicating that low Factor f^H (Retiring) scores are associated with a tendency to take a 'back seat' in meetings and group discussions, and give way to more assertive, self-assured colleagues.

Correlation with other tests' scales

NEO: Self-Conscious -0.57, Modesty -0.50

JTI: EI -0.62

OPPro: Gregarious 0.54, Persuasive 0.56

OPQ: Modest -0.49, Persuasive 0.46

MBTI: Extraversion 0.46, Introversion -0.72

PPQ: Extraversion 0.45, Insecure -0.39

EPQR: Extraversion 0.58

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FACTOR fI

Hard-headed, Utilitarian, Unsentimental, Lacks aesthetic sensitivity, tough-minded

Low scorers lack aesthetic sensitivity and have little interest in cultural or artistic pursuits. They are rarely moved by feelings of beauty, wonderment or awe; adopting a rather tough-minded, no-nonsense approach to life. Having little time for subjective, creative matters, they will be primarily concerned with whether things work effectively; giving little thought to aesthetic considerations such as design. They are likely to enjoy working with their hands and fixing things, participating in and watching sports and other physical activities. Others may see them as lacking refinement, culture or sophistication. They will however view themselves as being utilitarian realists who have little time for 'artistic people'. Their decisions will be based on practical, functional considerations rather than being influenced by sentiment or emotion.

Low scorers say:

They enjoy sports such as boxing and ice-hockey. They have never cried during a sad film. Sponsoring the arts is a waste of money. They do not appreciate poetry.

Tender-minded, Sensitive, Aesthetically aware, Sentimental

High scorers have a strong interest in cultural and artistic activities and pursuits. They are likely to have refined sophisticated tastes and to appreciate fine art, literature, music, etc. Highly subjective in their outlook, they often respond to situations and events at an intuitive, emotional level. Focusing on the subtle, aesthetic aspects of a task they are unlikely to have much interest in science or engineering. They may be viewed as being impractical or 'arty' and are unlikely to approach problems in a particularly task-focused way. Their decisions are likely to be swayed by sentiment, rather than being based on cool rational logic, or on a utilitarian focus on 'what works'. Creative, aesthetically sensitive individuals, they will generally have little interest in working with their hands, in fixing or repairing things.

High scorers say:

They are often moved by the beauty of nature. They enjoy romantic or historical novels. They enjoy theatre, ballet etc. They enjoy visiting art galleries and museums.

Correlations with other factors: Factor fI contributes to the Openness (to ideas) Global Factor, along with the other primary factors; Empathic (fA), Abstract (fM) and Radical (fQ_1). This reflects the fact that high Factor fI (Tender-minded) scores are associated with an openness to feelings, and to new, radical, artistic ideas. Factor fI also correlates negatively with Factor fO (Self-doubting), indicating that low Factor fI (Hard-headed) scores are associated with a tendency to take a realistic, unsentimental approach towards life.

Correlation with other tests' scales

NEO: Aesthetic 0.44

JTI: SN -0.55, TF 0.46

OPPro: Pragmatic -0.56

MBTI: Feeling 0.39

Bar-On: Self Actualisation 0.44

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FACTOR f_L

Trusting, Accepting, Unsuspecting, Credulous

Suspicious, Sceptical, Cynical, Doubting, Critical

Low scorers tend to take people at face value, rather than question their motives. They are quick to place their faith in others, believing that most people are dependable and trustworthy. Not in the least cynical, they are likely to have a positive view of human nature, believing that people are basically kind, thoughtful and genuinely concerned about the welfare of others. Not at all suspicious or sceptical, they may on occasion appear to be a little naïve. Inclined to give others the benefit of the doubt, they may at times be overly trusting. If others take advantage of their trust or good-will they are likely to feel let down. However, only in the most extreme circumstances will such events prompt them to question their positive, trusting view of human nature.

High scorers tend to be doubtful and mistrusting of other's motives. Not being inclined to take people at face value, they tend to reserve their judgements about others until they have hard, irrefutable evidence of their trustworthiness and honesty. Adopting a suspicious and sceptical approach to life, others may view them as being rather jaded or cynical. Tending to believe that people are likely to try to take advantage of their goodwill if given the chance, they will be reluctant to place their faith in others. As a result they may adopt a machiavellian, cynical approach to interpersonal relationships. This may reflect either a tendency to be manipulative or, alternatively, may be due to them having been repeatedly let down by people in the past.

Low scorers say:

People are basically honest and trustworthy. Most people are genuinely concerned about the welfare of others. It's best to trust other people.

High scorers say:

Only the gullible and naïve place their faith in others. Most people are only concerned about themselves. Most people will do almost anything for money.

Correlations with other factors: Factor f_L contributes to the Independence Global Factor, along with the other primary factors; Intellectance (B), Dominant (f_E) and Radical (f_Q). This reflects the fact that high f_L scores (Suspicious) are associated with a tendency to be questioning, doubtful and somewhat machiavellian in interpersonal relationships. Factor f_L also correlates negatively with Factor f_O (Confident), indicating that low Factor f_L (Trusting) scores are associated with a tendency to be more confident and trusting in interpersonal relationships.

Correlation with other tests' scales

NEO: Trust -0.74

JTI: TF -0.45

OPPro: Trusting -0.68

OPQ: Trusting -0.39

EPQR: Empathy-Sensitivity -0.36

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FACTOR fM

Concrete, Solution-focused, Realistic, Practical, Down-to-earth

Abstract, Imaginative, Absent-minded, Impractical, Absorbed in thought

Low scorers tend to be practical, down-to-earth realists. They are more concerned to ensure that things work, rather than explore how or why they work. Firmly grounded in the here-and-now, they tend to be very matter of fact in their outlook. Concrete thinkers, they are inclined to reject abstract theoretical perspectives. They may be disinclined to look beyond the obvious facts in a given situation in search of deeper possibilities and meanings. As a result others may view them as being rather pedestrian or unimaginative in their outlook. Focusing on observable facts and hard data, they may on occasion be overly concrete or literal in their thinking style. Not in the least prone to flights of fantasy, and not inclined to day-dream, they will be viewed as sensible pragmatists whose decisions emphasise the practicable and achievable.

High scorers are creative, imaginative individuals who have a strong interest in abstract theoretical ideas. Lacking concern for practical day-to-day realities, they may be seen as being somewhat 'other worldly'. Concerned to understand fundamental principles and concepts, they are likely to have little interest in mundane practical matters, which they may not give due consideration and thought to. Naturally inclined to look beyond the obvious facts in a given situation, they are likely to come up with novel, innovative ideas. Without clear goals, however, they may find themselves being carried away by their own thoughts and ideas, which may sometimes be quite unrealistic or fanciful. Orientated towards the world of theory and imagination, they may become so engrossed in their own ideas and thoughts as to lose sight of practicalities.

Low scorers say:

They prefer to work on practical, concrete problems. They rarely find themselves deeply engrossed in thought. They value realism over insight.

High scorers say:

They are interested in philosophical issues. They are idealists. They sometimes engage in wild flights of fantasy. Some of their ideas are unrealistic or fanciful.

Correlations with other factors: Factor fM contributes to the Openness (to ideas) Global Factor, along with the other primary factors; Empathic (fA), Tender-minded (fI) and Radical (fQ_1). This reflects the fact that high Factor fM (Abstract) scores are associated with an openness to abstract theoretical ideas and a tendency to become lost in thought. Factor fM also correlates negatively with Factor fG (Conscientious) and Factor fQ_3 (Self-disciplined), indicating that low Factor fM (Concrete) scores are associated with a tendency to take a task-focused, realistic approach to problems and have a preference for working on real-world, achievable goals.

Correlation with other tests' scales

NEO: Fantasy 0.67, Ideas 0.37

JTI: SN -0.68

OPPro: Pragmatic -0.64

OPQ: Conventional -0.36, Innovative 0.35, Conceptual 0.32

MBTI: Intuiting 0.57

PPQ: Unconventionality 0.38

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FACTOR f_N

Direct, Genuine, Artless, Open, Direct,
Straightforward

Restrained, Diplomatic, Socially astute, Shrewd,
Socially aware, Restrained

Low scorers tend to be direct and to the point in their social interactions. On occasion this may even verge towards being somewhat blunt or tactless. Thus others may be inclined to view them as lacking discretion or social sophistication. Genuine, forthright individuals, who are open and straightforward, they are likely to be direct in their interpersonal relationships. Having little concern for the impression they create in social situations, they may on occasion express their views in an artless or ill-considered manner. Inclined to 'put their cards on the table', others are likely to know where they stand with them. Most people will appreciate their honest, open, genuineness. However, lacking awareness of the nuances of social situations they may on occasion pass ill-considered, thoughtless comments.

High scorers tend to be diplomatic and restrained in their social interactions. Acutely aware of the subtle nuances of social settings, they are likely to be concerned not to do or say anything that may seem inappropriate or out of place. As a result others are likely to consider them to be shrewd and socially astute. Conscious of the impact they make on those around them, they are inclined to monitor their behaviour closely to ensure that they do not upset or offend others. Naturally discrete and diplomatic, others may view them as being excessively guarded individuals. Shrewd and socially astute, they may on occasion be somewhat manipulative in interpersonal relationships. Tending to 'play their cards close to their chest', they may often be reluctant to reveal their true feelings and opinions.

Low scorers say:

They sometimes say things that shock people.
They are inclined to 'speak first and think later'.
They can be blunt and tactless on occasion.

High scorers say:

They are careful not to use language others may consider inappropriate. They dislike loud, noisy, uncouth people. They are careful of the impression they create.

Correlations with other factors: Factor f_N contributes to the self-Control Global Factor, along with the other primary factors; Conscientious (f_G) and Self-disciplined (f_Q). This reflects the fact that high f_N scores (Restrained) are associated with a tendency to show restraint and decorum in social situations, and a sensitivity to protocol and social expectations. Factor f_N also correlates negatively with Factor f_E (Dominant) and Factor f_H (Socially-bold), indicating that low Factor f_N (Direct) scores are associated with a tendency to freely express views and opinions heedless of the social consequences of doing so.

Correlation with other tests' scales

NEO: Compliance 0.46, Deliberation 0.40

OPQ: Rule Following 0.35, Outspoken -0.30

OPPro: Assertive -0.45

EPQR: Impulsivity -0.41

Bar-On: Emotional Self Awareness 0.40, Interpersonal Relationships 0.41, Social Responsibility 0.45, Empathy 0.36

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FACTOR fO

Confident, Secure, Self-assured, Unworried,
Guilt-free

Self-doubting, Worrying, Insecure, Apprehensive

Low scorers are confident of their ability to deal successfully with life's challenges. As a result, they rarely worry about anticipated problems or difficulties. Secure and self-assured, they are rarely troubled by feelings of guilt or self-doubt. To others, they may on occasion appear to be overly confident, possibly lacking insight into their own personal weaknesses or failings. At times their lack of self-doubt, and their unquestioning belief in their own abilities, may cause them to be heedless of potential difficulties or problems. Not in the least apprehensive about facing possible challenges or threats, they rarely dwell on past problems and failures. Satisfied with their own achievements and accomplishments, they may be inclined to disregard potential opportunities for self-evaluation, self-improvement and growth, believing that this is not needed.

High scorers tend to be self-reproaching and troubled by feelings of insecurity and self-doubt. Threat sensitive, they tend to focus on anticipated dangers and pitfalls. Often fearing the worst, they may feel apprehensive when faced with new, unexpected challenges. Their natural apprehension and self-doubt may spur them on to perfect their own skills and abilities, so as to be better able to deal successfully with challenges in the future. However their lack of self-confidence, and tendency to doubt their own abilities, may on occasion prompt them to appear tentative, indecisive or lacking in resolve. Guilt prone, they may find themselves dwelling on past, often imagined, failures or mistakes. Concerned about what others may think of them, they may often need reassurance and encouragement from those around them.

Low scorers say:

They rarely dwell on past mistakes and failures. They are not troubled by feelings of self-doubt. They rarely worry about the future or about what others think of them.

High scorers say:

They find the thoughtless comments of some people upsetting. They are often troubled by feelings of guilt and are easily discouraged by criticism.

Correlations with other factors: Factor fO contributes to the Anxiety Global Factor, along with the other primary factors; Emotionally Stable (-ve fC), Tense-driven (fQ) and Suspicious (fL). This reflects the fact that high fO scores (Self-doubting) are associated with a tendency to be worrying, apprehensive and lacking in confidence in one's own abilities. Factor fO also correlates negatively with Factor fH (Socially-bold), indicating that low Factor fO (Confident) scores are associated with a tendency to feel confident and self-assured in social settings and not worry about the impression others form of them.

Correlation with other tests' scales

NEO: Self Conscious 0.62, Anxiety 0.57, Vulnerability 0.47

OPPro: Phlegmatic -0.58, Pessimistic 0.34

OPQ: Worrying 0.59, Relaxed -0.45

PPQ: Insecure 0.58

EPQR: Neuroticism 0.68

Bar-On: Self regard -0.52, Optimism -0.49

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FACTOR fQ_1

Conventional, Traditional, Conservative,
Conforming

Low scorers tend to be conventional in their outlook on life. They value traditional and tried and tested methods, and are likely to be wary of change for change's sake. Accepting of the status quo, they approach life with the motto 'if it's not broken, don't fix it'. They are inclined to question innovation, often believing that new approaches represent little more than change for the sake of change. Valuing convention and tradition, more radical colleagues may see them as being 'stick in the muds' who are not open to new ideas. Disliking change, they may on occasion reject novel, innovative ideas out of hand. They are likely to feel uncomfortable in rapidly changing environments that demand constant innovation, adaptation and adjustment.

Low scorers say:

It's generally best to follow tried and tested methods. They dislike breaking with tradition. They value custom and convention. They are conservative in their outlook.

Radical, Experimenting, Open to change,
Unconventional

High scorers value progress, innovation and change. They are inclined to reject tried and tested methods in favour of new, radical approaches to problems – even if these are unproven. Their attitudes and opinions are likely to be fairly unconventional, with them being naturally inclined to question the status quo. They dislike 'getting stuck in a rut' and will prefer to work in environments where they are free to initiate change, experiment and innovate. They may on occasion be overly quick to reject received opinion, which they may tend to dismiss 'out of hand' as being little more than 'old hat'. As a result they may at times ignore the value of acquired wisdom and knowledge. They should be comfortable working in rapidly changing environments, which require constant adaptation and adjustment.

High scorers say:

They like to dress in an unconventional manner. Their views and opinions are very different from those of most people. They rarely see the point of following tradition.

Correlations with other factors: Factor fQ_1 contributes to the Openness (to ideas) Global Factor, along with the other primary factors; Empathic (fA), Tender-minded (fI) and Abstract (fM). This reflects the fact that high Factor fQ_1 (Radical) scores are associated with an openness to new ideas and a willingness to break with tradition. Factor fQ_1 also correlates negatively with Factor fQ_3 (Self-disciplined), indicating that low Factor fQ_1 (Conventional) scores are associated with a tendency to value protocol and convention and a desire to preserve tradition.

Correlation with other tests' scales

NEO: Actions 0.46, Values 0.46, Ideas 0.44

OPPro: Flexible 0.42

OPQ: Conventional -0.58

PPQ: Conscientiousness -0.42

Bar-On: Independence 0.36, Assertiveness 0.36

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FACTOR fQ_2

Group-orientated, Sociable, Group dependent,
a 'Joiner'

Low scorers like to be surrounded by people. They prefer to take decisions in discussion with others, rather than act in an autonomous, independent manner. They dislike being on their own for long periods of time and may have difficulty working in environments that do not provide high levels of social contact. They like to take an active part in social affairs and will generally be happy to join social organisations, participate in committees, etc. Being extremely group-orientated, they may have difficulty functioning effectively in situations where they have to work independently from others and where social contact is not readily available. They are likely to enjoy team-work, but on occasion their strong need for social contact may interfere with their ability to complete work independently of others.

Low scorers say:

They quickly become bored when they are on their own. They prefer working as part of a team. They have their best ideas when discussing things with other people.

Self-sufficient, Solitary, Self-reliant,
Individualistic

High scorers are autonomous, self-sufficient individuals who prefer to take decisions on their own, rather than in discussion with others. They dislike working in team settings and may be reluctant to ask others for help or advice. As a result, they may not always give sufficient regard to public opinion, or other's expectations, when making decisions. They are comfortable spending time on their own and are likely to be happy in occupations that offer little social support or contact. They will prefer to avoid becoming actively involved with committees and group activities. They enjoy solitary pastimes, with others possibly viewing them as being somewhat reclusive, or even a little taciturn by nature. As a result, they may not always attend fully to the interpersonal aspects of a task.

High scorers say:

They try to avoid becoming involved with groups and social organisations. They find being surrounded by people distracting. They like doing things on their own.

Correlations with other factors: Factor fQ_2 contributes to the Extraversion Global Factor, along with the other primary factors; Enthusiastic (fF), Socially-bold (fH) and Empathic (fA). This reflects the fact that low fQ_2 (Group-orientated) scores are associated with a desire to be surrounded by people and participate in social and group activities. Factor fQ_2 also correlates negatively with Factor fN (Restrained), indicating that high Factor fQ_2 (Self-sufficient) scores are often associated with a social reserve and a tendency to withdraw from social interactions and group activities.

Correlation with other tests' scales

NEO: Gregariousness -0.67, Warmth -0.43

JTI: EI -0.48

OPPro: Gregarious -0.66

OPQ: Affiliative -0.54

MBTI: Introversion 0.60, Extraversion -0.33

PPQ: Extraversion -0.58

EPQR: Extraversion -0.69

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FACTOR fQ_3

Informal, Informal, Uncontrolled, Lax, Follows own urges

Low scorers have little concern for their perceived social standing. Tending to question authority, they believe that respect has to be earned rather than simply being due to one's position or rank. Believing that it is important to be free-thinking and 'true to oneself' they tend not to conform to traditional social mores – unless they are personally convinced of their value. Inclined to question accepted moral values, they believe that it is more important to follow the spirit of the law rather than obey it to the letter. As a result they are unlikely to be rigid or moralistic. They may lack discipline and self-control, and be inclined to seek immediate gratification of their needs, wants and desires. As a result they may on occasion appear to be somewhat impetuous, and they may have difficulty conforming to strict rules and regulations.

Low scorers say:

Formality and protocol are unnecessary. It is important to bring children up to be free-thinking and open minded. Politeness and good manners are often over-valued.

Self-disciplined, Compulsive, Fastidious, Exacting willpower

High scorers are concerned to maintain their social standing and reputation. Valuing self-control and self-discipline, they are unlikely to seek immediate gratification of their own needs and desires. In fact, they may be inclined actively to repress any thoughts or impulses that others might consider to be socially unacceptable or inappropriate. They are respectful of authority, status and social position, and believe it is important to follow correct protocol and procedure. They have a clear, well-defined set of moral values, which they believe it is important to adhere to. As a result others may possibly view them as being somewhat moralistic or rigid, and on occasion they may be a little dogmatic or obstinate. This however simply reflects the importance they attach to adhering to their strict code of conduct and their expressed high moral standards.

High scorers say:

It is important to show appropriate respect for authority. There is a great need for clear moral standards. People should exert more self-control.

Correlations with other factors: Factor fQ_3 contributes to the self-Control Global Factor, along with the other primary factors; Conscientious (fG) and Restrained (fN). This reflects the fact that high fQ_3 scores (Self-disciplined) are associated with a diligent sense of duty and responsibility, and a strong moral imperative. Factor fQ_3 also correlates negatively with Factor fI (Tender-minded) and Factor fM (Abstract), indicating that low Factor fQ_3 scores (Informal) are associated with a tendency to be free-thinking and questioning.

Correlation with other tests' scales

NEO: Feelings -0.54, Values 0.51

JTI: JP 0.46

OPPro: Flexible -0.35

OPQ: Rule Following 0.36, Variety Seeking -0.35

PPQ: Unconventionality -0.39

EPQR: Lie Scale 0.41

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FACTOR fQ_4

Composed, Relaxed, Placid, Patient

Tense-driven, Impatient, Low frustration tolerance

Low scorers tend to be relaxed and composed, dealing with frustrations in a calm, steady, easy-going manner. They can work under pressure without getting unduly 'wound-up' or tense. They are unlikely to become short-tempered or irritable if things go wrong. In general, they will be patient with friends and colleagues and tolerant of interruptions. They do not easily lose their temper and are not prone to angry outbursts or fits of rage. They are not easily frustrated by set-backs or failures and are rarely irritable or short-tempered. Others may view them as lacking motivation or drive, with them possibly appearing to be somewhat complacent when things go wrong. In general, they will find it easy to relax and unwind after a hard day and are unlikely to experience stress related health problems.

High scorers tend to be tense, impatient and hard-driving. Having low levels of frustration tolerance, they may at times appear to be restless, fidgety or ill-at-ease. Due to their high levels of personal drive, and resultant tense, nervous energy, they are likely to be short-tempered with people or things that get in their way. They dislike being kept waiting and may quickly become annoyed or irritable when things go wrong. As a result others may view them as being temperamental, 'touchy' or easily offended. Driven to succeed, they may be prone to believe that the only way to ensure that something is done properly is to do it oneself. As a result they are likely to have difficulty relaxing and may be prone to stress related health problems and feelings of excessive tension and irritability.

Note: Extremely high scores should be interpreted with caution, as these may reflect temporary high levels of stress, rather than the presence of this trait.

Low scorers say:

They rarely raise their voice or shout. They can't remember the last time they got really angry. They rarely get impatient with slow or indecisive people.

High scorers say:

They sometimes find themselves shaking with rage. On occasion they have felt like smashing things. They quickly get frustrated with other people.

Correlations with other factors: Factor fQ_4 contributes to the Anxiety Global Factor, along with the other primary factors; Emotionally Stable (-ve fC), Self-doubting (fO) and Suspicious (fL). This reflects the fact that high Factor fQ_4 scores (Tense-driven) are associated with high levels of tension, and a low level of frustration tolerance, that often prompts short temperedness and irritability. Factor fQ_4 also correlates negatively with Factor fN (Restrained), indicating that low Factor fQ_4 (Composed) scores are associated with a tendency to be calm, relaxed and placid in social settings; not being inclined to temper outbursts.

Correlation with other tests' scales

NEO: Angry hostility 0.80, Compliance -0.67, Impulsiveness -0.45

OPPro: Contesting 0.64

OPQ: Tough Minded -0.37, Relaxed -0.35

PPQ: Insecure 0.46

EPQR: Neuroticism 0.48

Bar-On: Impulse Control -0.68

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eIQ

Lacking empathy, moody, temperamental, insensitive, socially artless, low frustration tolerance

Empathic, caring, emotionally mature, socially astute, composed, perceptive

Low scorers tend to lack insight into other's thoughts, feelings and behaviour. As a result, in social situations, they may come across as artless and insensitive and they may be inclined to make social blunders. Failing to understand things in the broader social context, they may tend to take things personally and be defensive in the face of criticism. Having poor emotional regulation skills, they may appear moody and temperamental at times. Lacking the ability to manage frustration effectively, they may be prone to emotional outbursts. They may have difficulty dealing with the emotional challenges of setbacks and failures and this may limit their ability to meet future demands and challenges. Emotionally vulnerable, with a fragile sense of self, they may not always be in touch with their own core feelings, values and needs. As a consequence they may come across as lacking in interpersonal warmth, and as being distant, uncaring and unsympathetic.

High scorers are insightful and perceptive, having genuine empathy and understanding for others. As a result, they are likely to come across as warm, caring and considerate. Aware of the nuances of social situations, they will be motivated to avoid social gaffes or blunders. In tune with those around them, they will be viewed as being sensitive and responsive to other's needs and feelings. Emotionally mature, they have insight into their own feelings and are able to manage and regulate their emotions in a constructive manner. Feeling secure and confident in themselves, they are not prone to emotional outbursts. Generally satisfied with their past achievements, they face challenges in a constructive and mature manner and are not prone to inappropriate feelings of self-doubt, despair or despondency. Having a grasp of the broader social picture, and understanding other's motives, they are unlikely to become engaged in petty disputes and rivalries.

Low scorers say:

They can be temperamental and moody. They are easily discouraged and troubled by self-doubt. They have little concern, understanding and empathy for others.

High scorers say:

They are compassionate, understanding and sympathetic. They avoid inappropriate or offensive language. They feel satisfied with, and in control of, their lives.

Correlations with other factors: Emotional Intelligence (eIQ) weights on the low end of the Anxiety Global Factor, along with the primary factors; Emotionally Stable (f^C), Suspicious (f^L), Self-doubting (f^O) and Composed (f^Q_4). This reflects the fact that high eIQ scorers are emotionally mature and resilient. eIQ also weights on Factor f^A (Empathic) and Factor f^N (Restrained). The former reflects the lack of empathy and interpersonal warmth of low scorers and the latter their lack of social astuteness.

Correlation with other tests' scales:

16PF5: Calm (0.64), Apprehensive (-.54), Impatient (-.53)
 OPPro: Phlegmatic (0.62), External (-.30)
 Bar-on: Overall Emotional Intelligence (0.80)

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WORK ATTITUDE

Absent-minded, lax, disregards rules and obligations, unconventional

Persevering, dutiful, solution-focussed, conscientious, conforming

Low scorers are unconventional, radical and inclined to question accepted wisdom. Seeing little reason to blindly follow custom and practice, they may be disinclined to follow rules and may circumvent set systems and procedures. Believing that respect has to be earned, rather than being due to status and position, they are inclined to question authority. Their contribution to the organisation may be more in the areas of creation and innovation rather than ensuring that tasks are completed on time and to standard. They may be inclined to go their own way, possibly sacrificing those obligations and duties that they see as being onerous or unnecessary in order to achieve their objectives. They may be unsystematic and disorganised in their work, preferring to focus on the bigger picture than on the detailed aspects of the task at hand.

High scorers are persevering, conscientious and dutiful. Methodical and systematic, they will be motivated to diligently follow set systems and procedures. Conventional and conservative in their approach to problem solving, they will prefer established methods over experimental ways of doing things. Their contribution to the organisation will be more in the area of ensuring that tasks are completed to agreed standards, rather than being innovative and creative. Rule-bound and conforming, they will be respectful of authority and are unlikely to challenge the status-quo. This will pre-dispose them to be honest and trustworthy employees who are committed to the organisation, its culture and rules. Perfectionistic and attentive to detail, they will set themselves high standards of task completion, believing that if a job is worth doing it is worth doing well.

Low scorers say:

They are unsystematic and disorderly. They dislike following established procedures. They have little regard for authority and conventional moral standards.

High scorers say:

They are systematic and orderly. They set themselves high standards of work and behaviour. They are moral and principled, conventional, down-to earth and practical.

Correlations with other factors: WA weights on the self-Control Global Factor, along with Conscientious (f^2G), Self-disciplined (f^2Q_3) and Conventional (f^2Q_1). This reflects the fact that high scorers are persevering with a strong sense of duty and obligation. WA also weights on Abstract (f^2M), indicating that low scores can be absent-minded and unrealistic, with little focus on the practical considerations of the task at hand.

Correlation with other tests' scales:

16PF5: Rule-boundness (0.55), Abstractness (-0.50), Perfectionism (0.66)

OPPro: Flexible (-0.69), Pragmatic (0.41)

JTI: Judging-Perceiving (-0.64) Sensing-Intuiting (-0.54)

Dedicated Questionnaires: Work Attitude Questionnaire (0.52), Counter Productive Work Behaviour (-0.61)

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RELIABILITY AND VALIDITY

INTRODUCTION

In the following sections data are presented on the psychometric properties of the 15FQ+. These data demonstrate that the 15FQ+ meets the necessary technical requirements with regard to standardisation, reliability and validity, to ensure that assessors can use this tool with confidence to aid their selection and assessment decisions. Before presenting this data on the psychometric properties of the 15FQ+, the concepts of standardisation, reliability and validity will be briefly outlined.

STANDARDISATION

Normative data allows us to compare an individual's score on a standardised scale against the typical scores obtained from a clearly defined group of respondents (e.g. graduates, the general population, etc.). To enable any respondent's scores on the personality factors assessed by 15FQ+ to be meaningfully interpreted, the test was standardised on a population similar to that on which it has been designed to be used (e.g. people in a wide range of technical, managerial, professional, sales and administrative/clerical roles). Such standardisation ensures that the scores obtained on the 15FQ+ primary factors can be meaningfully interpreted by referring them to a relevant distribution of scores.

RELIABILITY

The reliability of a test assesses the extent to which the variation in test scores is due to true differences between people on the trait(s) being measured – in this case a set of 16 primary personality factors – or to random measurement error. Reliability is generally assessed using one of two different methods; one assesses the stability of the test's scores over time, the other assesses the internal consistency, or homogeneity, of the test's items.

Reliability: Temporal Stability Also known as test-retest reliability, this method for assessing a test's reliability involves determining the extent to which a group of people obtain similar scores on a test when it is administered at two points in time. In the case of personality tests we would expect scores on a test to be relatively

stable over modest periods of time, as personality traits (by definition) describe stable and enduring characteristics of how a person typically thinks, feels and acts across a range of situations. Thus if the test were perfectly reliable, that is to say test scores were not influenced by any random error, respondents would be expected to obtain the same factor scores each time the test was administered, as their personality would not have changed between the two points in time when they completed the test. In this way, the extent to which respondent's scores are unstable over time can be used to estimate the test's reliability. Stability coefficients provide an important indicator of a test's likely usefulness. If these coefficients are low (less than 0.7 for personality tests) then this suggests that the test is not a reliable measure, and is therefore of limited practical use for assessment and selection purposes.

Reliability: Internal Consistency Also known as item homogeneity, this method for assessing a test's reliability involves determining the extent to which, if people score one way on one item (e.g. respond to one item in an introverted way) they will respond in the same way to the other items on the test that measure the same construct (e.g. respond in an introverted way to the other test items). If each of the test's items were perfectly reliable (i.e. scores were not influenced by random error), then testees would be expected to respond in a consistent manner across all the items that assess the same personality factor. Thus, the extent to which respondent's scores on each item on a given personality factor are correlated with each other, can be used to estimate the test's reliability.

The most common internal consistency measure of reliability is Cronbach's (1951) alpha coefficient. If the items on a scale have high inter-correlations with each other, then the test is said to have a high level of internal consistency (reliability) and the alpha coefficient will be high. Thus a high coefficient alpha indicates that the test's items are all measuring the same construct, and are not greatly

influenced by random measurement error, while a low alpha coefficient suggests that *either* the scale's items are measuring different attributes, *or* the presence of significant random error. If the alpha coefficient is low (significantly less than 0.7 for personality tests), this indicates that the test is not a reliable measure, and is therefore of limited use for assessment and selection purposes.

VALIDITY

The fact that a test is reliable only means that the test is consistently measuring a construct, it does not indicate *what* construct the test is consistently measuring. The concept of validity addresses this issue. As Kline (1993) has noted, "a test is said to be valid if it measures what it claims to measure".

An important point to note here is that a test's reliability sets an upper bound for its validity. That is to say a test cannot be more valid than it is reliable, because if it is not consistently measuring *a* construct it cannot be consistently measuring *the* construct it was developed to assess. (Thus a test's reliability is typically assessed before the question of its validity is addressed.) There are two approaches to examining a test's validity.

Validity: Construct Validity Construct validity assesses whether the characteristic which a test is measuring is psychologically meaningful and consistent with how that construct is defined. One common way of assessing a test's construct validity is by demonstrating that the test correlates with other major tests which measure related constructs and does *not* correlate with tests that measure different constructs. (This is sometimes referred to as, respectively, a test's convergent and discriminate validity). Thus demonstrating that a test which measures extraversion is more strongly correlated with an alternative measure of extraversion than it is with a measure of conscientiousness, would be one source of evidence of the test's construct validity.

Validity: Criterion Validity This method for assessing the validity of a test involves demonstrating that the test meaningfully predicts some real-world criteria. For example, a valid test of extraversion might be expected to predict success in sales roles, while a valid test of conscientiousness might be expected to predict success in administrative roles.

Moreover, there are two types of criterion validity – predictive validity and concurrent validity. Predictive validity assesses whether a test is capable of predicting an agreed criterion which will be available at some future point in time – e.g. can a test of extraversion predict the future sales success of job applicants. Concurrent validity, on the other hand, assesses whether a test can be used to predict a criterion which is available at the same time as the test was completed – e.g. can a test of extraversion predict current (rather than future) sales success.

STANDARDISATION PROCEDURE AND NORMATIVE DATA

The total standardisation sample is based on 1,186 male and female adults. All the questionnaires were completed between August 1999 and April 2000. All questionnaires were administered under strictly standardised procedures by individuals trained to the British Psychological Society's Level B Certificate of Competence in Occupational Testing.

As indicated in Table 1, the norm sample's age distribution is quite wide, and is broadly representative of the professional working population. The sample comprises primarily of people in graduate, professional and managerial occupations, with a mean age of 31.5 and 50% of the sample falling within the 25-39 age range.

Table 2, which provides the breakdown of the norm sample by sex, reveals a very balanced sample with respect to sex. Four respondents failed to indicate their sex, with this constituting approximately one third of a percent of the total sample.

Table 3 provides a break-down by ethnic origin. Just over 9% of the total sample identified themselves as belonging to ethnic origin categories other than White European. Of this group of 111, approximately 70% were of African or Afro-Caribbean decent, with almost 30% being of Asian descent.

Table 1: Descriptive Statistics of Age

Mean	31.49
SD	11.15
Minimum	16
Maximum	64
Lower Quartile	25
Upper Quartile	39

Table 2: Breakdown by Sex of Respondent

	Count	Percentage
Male	561	47.30
Female	621	52.36
Unknown	4	0.34
Total	1186	100

Table 3: Breakdown of Ethnic Origin of Respondent

	Count	Percentage
Other	111	9.39881
White	1070	90.60119
Missing	5	0.42337

RELIABILITY OF THE 15FQ+

INTERNAL CONSISTENCY

Table 4 presents the alpha coefficients for each of the 16 personality factors, for both the standard (Form A) and the short forms (Form C) of the 15FQ+. Inspection of this table reveals that all these scales have good levels of internal consistency reliability, with all the alpha coefficients being above 0.7 for the standard (Form A) form, and above 0.6 for the short (Form C) form of the test. Alpha coefficients in this range indicate that the 15FQ+ factors are highly reliable, given the relative brevity of these scales (twelve and six items respectively). Not surprisingly, the short form factors have significantly lower levels of reliability than do their respective long form equivalents. This is to be expected, and reflects the brevity of the Form C scales.

SHORT TERM TEST-RETEST RELIABILITY

Table 5 presents the short term (two weeks) test-retest reliability coefficients for each of the 16 personality factors, for both the standard (Form A) and the short forms (Form C) of the 15FQ+. Inspection of this table reveals that all these scales have excellent levels of reliability, when the relative lengths of the standard and short forms are taken into account. Most importantly, the test-retest reliability coefficients for each scale are substantially larger than are their respective alpha coefficients. This reflects two factors. Firstly, that the alpha coefficient provides a lower bound measure of the scale's reliability and, secondly, that these factors are measuring broad source traits, rather than narrow (i.e. highly homogeneous) surface traits.

Table 4: Reliability Coefficients (alpha) for the 15FQ+ factors

Factor	Form A			Form C		
fA	.83	.78	.74	.64	.64	.62
fB	.77	.80	.77	.62	.71	.61
fC	.80	.77	.78	.60	.63	.63
fE	.80	.79	.74	.60	.66	.60
fF	.75	.78	.75	.63	.63	.62
fG	.85	.81	.82	.60	.64	.65
fH	.85	.81	.82	.68	.68	.66
fI	.74	.77	.74	.64	.63	.60
fL	.78	.77	.75	.66	.62	.61
fM	.80	.79	.72	.64	.64	.58
fN	.79	.78	.76	.67	.67	.62
fO	.82	.83	.82	.67	.69	.66
fQ ₁	.81	.79	.76	.60	.72	.61
fQ ₂	.82	.78	.74	.67	.62	.62
fQ ₃	.78	.76	.76	.63		.61
fQ ₄	.84	.81	.79	.60	.62	.64
SD	.72	.70	.72	—	—	—
	student sample n=183	adult sample n=325	professional managerial n=939	student sample n=183	adult sample n=325	professional managerial n=939

Table 5: Short Term (two weeks) Test-Retest Reliability Coefficients for the 15FQ+ factors

Factor	Form A	Form C
fA	.79	.68
fB	.88	.75
fC	.82	.73
fE	.82	.71
fF	.85	.73
fG	.88	.77
fH	.86	.78
fI	.86	.77
fL	.84	.72
fM	.87	.76
fN	.79	.71
fO	.77	.69
fQ ₁	.85	.75
fQ ₂	.86	.76
fQ ₃	.84	.73
fQ ₄	.89	.78
SD	.74	—
student sample (n=87)		

LONG TERM TEST-RETEST RELIABILITY

Table 6 presents long term (four months) test-retest reliability coefficients for the standard (Form A) and short forms (Form C) of the 15FQ+ on a sample of 82 undergraduates. These data demonstrate that the 15FQ+ has a high degree of temporal stability over reasonable periods of time. Inspection of this table reveals that all these scales have excellent levels of reliability, when the relative lengths of the standard and short forms are taken into account. These test-retest coefficients are more than comparable to those reported for similar personality instruments.

RELIABILITY (INTERNAL CONSISTENCY) OF THE CRITERION KEYED (DERIVED) SCALES

Table 7 presents the alpha coefficients for each of the criterion keyed scales, for both the standard (Form A) and the short forms (Form C) of the 15FQ+. Inspection of this table reveals that all these scales have acceptable levels of internal consistency, when the length of the scales is taken into account. Most significantly, the alpha coefficients for these scales are somewhat lower than are those for the 16 personality factors. This reflects the fact that these scales were constructed via criterion keying (which maximises the scale's validity) rather than being constructed via traditional item analytic procedures (which maximise the scale's internal consistency).

SHORT TERM TEST-RETEST RELIABILITY OF THE CRITERION KEYED (DERIVED) SCALES

Table 8 presents the short term (two weeks) test-retest reliability coefficients for each of the criterion keyed scales, for both the standard (Form A) and the short forms (Form C) of the 15FQ+. Inspection of this table reveals that all these scales have acceptable levels of temporal stability, over short periods of time.

Table 6: Long Term (four months) Test-Retest for the 15FQ+ Scales

15FQ+	Form A	Form C
fA	.74	.62
fB	.82	.71
fC	.77	.68
fE	.77	.66
fF	.80	.67
fG	.83	.71
fH	.81	.72
fI	.80	.73
fL	.79	.66
fM	.82	.71
fN	.74	.65
fO	.72	.63
fQ ₁	.79	.71
fQ ₂	.81	.70
fQ ₃	.79	.68
fQ ₄	.84	.72
SD	.69	–

Table 7: Reliability Coefficients (alpha) for the Criterion Keyed Scales

Scale	15FQ+ Form A		15FQ+ Form C	
Fake Good	.84	.73	.69	.62
Fake Bad	.78	.72	-	-
eIQ	.73	.71	-	-
WA	.76	.83	-	-
	student sample n=183	adult sample n=325	student sample n=183	adult sample n=325

Table 8: Short Term (two weeks) Test-Retest Reliability Coefficients for the Criterion Keyed Scales

Scale	Form A	Form C
Fake Good	.66	.45
Fake Bad	.61	-
eIQ	.79	-
WA	.79	-
	student sample (n=87)	student sample (n=87)

LONG TERM TEST-RETEST RELIABILITY OF THE CRITERION KEYED (DERIVED) SCALES

Table 9 presents the long term (four months) test-retest reliability coefficients for each of the criterion keyed scales, for both the standard (Form A) and the short forms (Form C) of the 15FQ+. This table demonstrates that these scales have acceptable levels of temporal stability over moderate periods of time.

ALTERNATE FORM RELIABILITY FOR THE STANDARD (FORM A) AND SHORT (FORM C) FORMS OF THE 15FQ+

Table 10 presents the correlations (corrected and uncorrected) between forms A and C of the 15FQ+. (These correlations can be interpreted as being broadly equivalent to alternate form reliabilities.) The correlations between these forms provide evidence of the congruence of these scales across these two forms of the 15FQ+. However, as all the items in the short form (Form C) of this test are included in the standard form (Form A), the uncorrected correlation between these two forms will be inflated due to their shared items. Thus the uncorrected correlations provide an upper bound estimate of the 'true' correlation between these forms. Similarly, the corrected correlations (Levy, 1967) estimate the lower bound of the 'true' correlation between these two forms.

Inspection of Table 10 indicates that the corrected correlations between Form A and Form C of the 15FQ+ are all substantial, demonstrating that these forms are broadly congruent with each other. Thus the validity data presented below (for Form A of the 15FQ+) can also be considered to be relevant to Form C of the 15FQ+. However, just as the reliabilities for Form C are lower than they are for Form A (due to the relative brevity of this test), so too will Form C have lower validity than Form A.

Table 9: Long Term (four months) Test-Retest Reliability Coefficients for the Criterion Keyed Scales

Scale	Form A	Form C
Fake Good	.71	.55
Fake Bad	.69	-
eIQ	.71	-
WA	.73	-
	student sample (n=82)	student sample (n=82)

Table 10: Correlations (uncorrected and corrected) between forms A and C of the 15FQ+

Factor	Uncorrected	Corrected
f ² A	.69	.91
B	.76	.93
f ² C	.69	.91
f ² E	.72	.92
f ² F	.69	.90
f ² G	.73	.91
f ² H	.72	.89
f ² I	.67	.87
f ² L	.69	.90
f ² M	.69	.90
f ² N	.68	.89
f ² O	.75	.91
f ² Q ₁	.74	.91
f ² Q ₂	.93	.69
f ² Q ₃	.68	.89
f ² Q ₄	.61	.91

CONSTRUCT VALIDITY OF THE 15FQ+

CORRELATIONS BETWEEN THE 15FQ+ FACTORS AND THE ORIGINAL 15FQ

Table 11 presents correlations between the personality factors assessed by the 15FQ and the 15FQ+, on a sample of 70 course delegates who completed both of these tests as part of the course requirement. The 15FQ was developed in the early 1990's to assess the personality factors measured by Form A of the 16PF4. Considerable evidence demonstrating the validity of this test has been reported in the 15FQ manual.

Inspection of Table 11 indicates that, when corrected for measurement error, ten of the 16 corrected correlations between the 15FQ+ factors and their corresponding 15FQ scale approach unity, providing strong support for the validity of these 15FQ+ primaries. Of the remaining six factors, all but two correlate substantially with their respective 15FQ dimension – these are Factors $\mathbb{f}A$ (Empathic) and $\mathbb{f}Q_4$ (Tense-driven). With regard to Factor $\mathbb{f}A$ this modest correlation reflects the fact that this 15FQ+ primary assesses an empathic concern for, and interest in, other people rather than assessing sociability and interpersonal warmth as is measured by the respective 15FQ dimension (Outgoing). Similarly, the modest correlation between the 15FQ+ primary (Tense-driven) $\mathbb{f}Q_4$ and the respective 15FQ dimension reflects the fact that this 15FQ+ factor assesses a tense, competitive, hostile interpersonal attitude, rather than assessing emotional tension and anxiety as does the corresponding 15FQ dimension.

As noted above there is considerable evidence demonstrating the validity of the 15FQ (some of which is reported towards the end of this manual). The good convergent validity that the data in Table 11 demonstrate, between the 15FQ scales and their respective 15FQ+ primaries, therefore suggests that it is reasonable to generalise the validity data that have been reported for the 15FQ to the 15FQ+.

CORRELATIONS BETWEEN THE 15FQ+, THE 16PF4 (FORM A) AND 16PF5

In order to examine further the validity of the 15FQ+ each of the 16 personality factors assessed by this test were correlated with their equivalent factors on the 16PF4 and 16PF5. Table 12 presents these correlations, both

Table 11: Correlations between the 15FQ+ factors and the original 15FQ

15FQ+ Factor	15FQ	
		(corrected)
$\mathbb{f}A$	.32	.43
$\mathbb{f}B$	-	-
$\mathbb{f}C$	.54	.75
$\mathbb{f}E$	.65	.93
$\mathbb{f}F$	.76	1
$\mathbb{f}G$	.74	.97
$\mathbb{f}H$	.88	1
$\mathbb{f}I$	.71	.98
$\mathbb{f}L$	.78	1
$\mathbb{f}M$	.63	.84
$\mathbb{f}N$	.55	.77
$\mathbb{f}O$	.74	.95
$\mathbb{f}Q_1$	.86	1
$\mathbb{f}Q_2$	.78	1
$\mathbb{f}Q_3$	.80	1
$\mathbb{f}Q_4$	.29	.40

Table 12: Correlations of the 15FQ+ factors with 16PF (Form A) and 16PF5

15FQ+ Factor	16PF (Form A)		16PF5	
		(corrected)		(corrected)
$\mathbb{f}A$	.31	.37	.55	.70
$\mathbb{f}B$	.10	-	.34	-
$\mathbb{f}C$	.59	1	.81	1
$\mathbb{f}E$	.68	.99	.82	1
$\mathbb{f}F$	.72	.98	.81	1
$\mathbb{f}G$	.55	.89	.79 [†]	.75
$\mathbb{f}H$	.78	.99	.88	1
$\mathbb{f}I$	.50	.75	.47	.56
$\mathbb{f}L$	.29	.52	.60	.79
$\mathbb{f}M$	.26	.65	.79	1
$\mathbb{f}N$	.30	.70	.25	.31
$\mathbb{f}O$	.68	.99	.83	1
$\mathbb{f}Q_1$	.29	.43	.60	.84
$\mathbb{f}Q_2$	.51	.85	.81	1
$\mathbb{f}Q_3$	.30	.50	.57*	1
$\mathbb{f}Q_4$	.69	.94	.69	.89
FG	.49	.72	-	-
FB	.48	.73	-	-

student sample n=183

[†]Correlation with 15FQ+ Factor $\mathbb{f}Q_3$

*Correlation with 15FQ+ Factor $\mathbb{f}G$

corrected and uncorrected for attenuation due to measurement error. Inspection of this table reveals that all of these correlations are substantial, and that many of the corrected correlations approach unity. These correlations demonstrate that the 15FQ+ is measuring factors that are broadly equivalent to those originally identified by Cattell and his colleagues.

Most notably, however, the 15FQ+ Factor $\mathbb{F}G$ (Conscientious) correlated most substantially with the 16PF5 Factor $\mathbb{F}Q_3$ and the 15FQ+ Factor $\mathbb{F}Q_3$ correlated most substantially with the 16PF5 Factor $\mathbb{F}G$. This reflects the fact that the meaning of these two factors has been reversed in the fifth edition of the 16PF, providing further evidence that the 15FQ+ has stayed true to the original source traits first identified by Cattell and his colleagues.

THE RELATIONSHIP BETWEEN THE 15FQ+, THE 16PF4 & 16PF5 GLOBAL FACTORS

Table 13 and Table 14 present the relationship between the 15FQ+ global factors and (respectively) their equivalent global factors on the 16PF4 and 16PF5, on distinct undergraduate samples of 82 and 85 participants. It is evident from these tables that there is considerable overlap at the global factor level between the 15FQ+ and these two forms of the 16PF.

The substantial correlations between the 15FQ+ and 16PF4 Extroversion, Agreeableness and Anxiety global factors indicate that these broad personality traits are measuring comparable constructs across these two tests. Although the correlations remain high, and highly statistically significant, some divergence is observed between the self-Control and Openness global factors for the 15FQ+ and the 16PF4. In part this is likely to reflect the fact that Factor M (the least reliable of the 16PF4 factors) loads very highly on the Openness Global Factor, with the associated increase in measurement error attenuating this correlation.

The overlap between the 15FQ+ and 16PF5 global factors is much higher than it is with the 16PF4 global factors, with the median correlation between the respective global factors being 0.81. Once again the lowest correlation is with the Openness Global Factor, although this remains highly statistically significant.

Another notable feature of the correlations presented in these tables is that they

Table 13: Correlation between 15FQ+ and 16PF4 global factors

	PF4 EX	PF4 AX	PF4 TM	PF4 IN	PF4 SC
I Extroversion	.76	-.29	-.01	.41	-.03
II Anxiety	-.22	.84	-.04	.08	-.17
III Openness	.27	.10	-.48	.25	-.02
IV Agreeableness	-.28	.14	.16	-.71	-.05
V self-Control	-.05	.14	.09	-.12	.59

Table 14: Correlation between 15FQ+ and 16PF5 global factors

	PF5 EX	PF5 AX	PF5 TM	PF5 IN	PF5 SC
I Extroversion	.88	-.27	-.12	.45	-.29
II Anxiety	-.22	.87	-.04	-.05	-.03
III Openness	.11	.14	-.65	.29	-.29
IV Agreeableness	-.03	.08	.29	-.81	.19
V self-Control	-.08	.13	.43	-.21	.79

demonstrate excellent, and largely similar, levels of convergent and divergent validity with the 16PF4 and 16PF5 global factors. It can be observed that the 15FQ+ Extroversion Global Factor shows some correlation with the Independence Global Factor in both the 16PF4 and 16PF5. This partly reflects the fact that in both the 16PF4 and 16PF5, Factor H (Socially-bold), weights highly on the Independence Global Factor whereas in the 15FQ+ Factor $\mathbb{F}H$ weights exclusively on the Extraversion Global Factor. The overlap that exists between 15FQ+ self-Control and 16PF5 Tough-mindedness global factors may also be accounted for by the fact that these otherwise distinct global factors respectively share Q_1 and $\mathbb{F}Q_1$ as contributing primary factors.

In order to explore further the validity of the 15FQ+, the scale scores were factor analysed (on a student sample) along with the scale scores from the 16PF4. (This is often considered to be the most robust method for examining the validity of a personality questionnaire.) The scree test indicated that these data were best described by a five-factor solution, with five factors being retained and rotated to simple structures via Varimax rotation. The results of this factor analysis are presented in Table 15. Inspection of this table indicates that, although this factor structure is not totally equivalent with the global 15FQ+

factors identified above, these data nonetheless provide broad support for the validity of the 15FQ+. (The slight discrepancy between this factor structure and the global factors reported for the 15FQ+ is likely to reflect issues of sampling error, resulting from the relatively small size of the sample – with a ratio of items to participants of only 5.7).

Table 15 indicates that all the 15FQ+ primaries that weight on the Extraversion Global Factor, weight on the first factor along with the extraversion scales from the 16PF4. This provides strong support for the convergent construct validity of these primary factors across these two tests. Moreover, the finding that the 16PF4 Factor E, and the 15FQ+ Factors β E and β N, also weight on this extraversion factor indicates that, not surprisingly, people who are Dominant (+ve β E) and Forthright (-ve β N) tend to be more extraverted than do people who are Accommodating (-ve β E) and Restrained (+ve β N). Inspection of Table 15 further demonstrates that all the anxiety factors on the 15FQ+ weight on the second factor, along with the anxiety scales from the 16PF4. This provides strong support for the convergent construct validity of these primaries across these two tests.

The third factor presented in Table 15 is broadly equivalent to the 16PF4 Global Factor Tough-Poise – with the exception that the 15FQ+ dimension β A (Empathic) does not load on this factor. The 15FQ+ Factors β I, β M and β Q₁ weight on this factor, along with the 16PF4 Factors I and M. This suggests that these 15FQ+ primaries are, as would be expected, assessing a broadly aesthetically minded, abstract, radical, intellectual orientation.

The fourth factor presented in Table 15 assesses a broad construct of self-assured assertiveness, with this factor consisting of the 15FQ+ Factors β E (Dominant), β (Intellectance) and β N (Direct). The finding that Intellectance (15FQ+ β) weights on this higher order factor reflects the fact that this scale assesses a person's confidence in their intellectual abilities, and hence their willingness to express their views and opinions in a forthright manner. Similarly, the finding that the 15FQ+ Factors β H and β O, as well as the 16PF4 Factors H and O also weight on this factor, reflects the fact that high β H scores are associated with social confidence, and that low β O scores are associated with a lack of threat sensitivity. This results in a willingness

Table 15: Factor analysis of the 15FQ+ and 16PF (Form A) scales

Scale Factors	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
15FQ+ β A	.61	-	-	.31	-
15FQ+ β	-	-	-	.48	-
15FQ+ β C	-	.76	-	-	-
15FQ+ β E	.40	-	-	.68	-
15FQ+ β F	.82	-	-	-	-
15FQ+ β G	-	-	-	-	.75
15FQ+ β H	.63	-	-	.42	-
15FQ+ β I	-	-	.63	-	-
15FQ+ β L	-	-.38	-	-	-
15FQ+ β M	-	-	.51	-	-.36
15FQ+ β N	-	-	-	-.39	.50
15FQ+ β O	-	-.61	-	-.40	-
15FQ+ β Q ₁	-	-	.45	-	-
15FQ+ β Q ₂	-.71	-	-	-	-
15FQ+ β Q ₃	-	-	-	-	.65
15FQ+ β Q ₄	-	.71	-	-	-
16PF A	.31	-	-	-	-
16PF B	-	-	-	-	-
16PF C	-	.74	-	-	-
16PF E	.32	-	-	.65	-
16PF F	.69	-	-	-	-
16PF G	-	-	-	-	.74
16PF H	.71	-	-	.31	-
16PF I	-	-	.61	-	-
16PF L	-	-.67	-	-	-
16PF M	-	-	.45	-	-
16PF N	-.43	-	-	-.37	.37
16PF O	-	-.65	-	-.42	-
16PF Q ₁	-	-	-	-	-
16PF Q ₂	-.56	-	-	-	-
16PF Q ₃	-	-	-	-	.69
16PF Q ₄	-	.85	-	-	-
student sample n=183					

to express views and opinions boldly in group settings.

Inspection of Table 15 indicates that Factors G Q₃ and N from the 16PF4 and Factors β G, β Q₃ and β N from the 15FQ+ weight on the fifth and final factor. This is consistent with this higher order factor assessing self-control, thus providing further evidence of the convergent construct validity of these primary factors across these tests. Finally, the fact that the 15FQ+ Factor β I (Tender-minded) weights on the fifth factor in this factor analysis may reflect the finding that in many samples the Global Factors self-Control and Tough Poise are often modestly correlated with each other.

THE RELATIONSHIP BETWEEN THE 15FQ+ AND THE NEO PI-R

Table 16 lists the most significant correlations between the NEO facets and the 15FQ+ primary factors on a sample of 60 undergraduates. (All correlations are significant at the 1% level or less.)

Inspection of the correlations presented in this table indicates that these provide strong support for the construct validity of the 15FQ+ primaries. Most notably, this pattern of results is broadly similar to the pattern of correlations reported between the NEO PI-R and the 16PF5.

With regard to the 15FQ+ primaries that load on the Extraversion Global Factor the following points are noteworthy. Firstly, as would be expected, the largest correlation with the 15FQ+ Factor $\mathbb{F}A$ (Empathic) is with the NEO PI-R facet Warmth, followed by the facet Tender-minded. This provides strong support for the convergent construct validity of this 15FQ+ primary factor, which assesses a warm-hearted interest in people. Similarly, the modest negative correlation between this primary and the NEO PI-R facet Angry hostility, is consistent with the definition of this 15FQ+ primary factor as assessing an empathic, caring concern for others. Secondly, as would be predicted, the strongest correlation between the 15FQ+ Factor $\mathbb{F}F$ (Enthusiastic) and the NEO PI-R is with the facet Gregariousness, reflecting the fact that high scores on this primary factor are associated with an enthusiastic, lively interest in people and an active participative approach to social relationships. Moreover, the correlations with the NEO PI-R facets Positive emotion and Excitement seeking are consistent with this primary factor's definition as assessing a happy-go-lucky, carefree approach to life. Thirdly, the negative correlations between the 15FQ+ Factor $\mathbb{F}H$ (Socially bold) and the NEO PI-R facets Self-consciousness and Modesty, provide strong support for the convergent construct validity of this primary factor, which assesses boldness and confidence in social settings. Moreover, the correlation between the 15FQ+ Factor $\mathbb{F}H$ and the NEO PI-R facet Activity reflects the fact that this 15FQ+ primary assesses a venturesome orientation towards life. Finally, the substantial negative correlations between the 15FQ+ Factor $\mathbb{F}Q_2$ (Self-sufficient) and the NEO PI-R facets Gregariousness and Warmth is consistent with the definition of this primary, with high scores on this 15FQ+ primary factor

Table 16: Correlations between the 15FQ+ and the NEO PI-R facets

15FQ+ Factor	NEO facet
$\mathbb{F}A$	Warmth .46, Tender-minded .45, Angry hostility -.38
$\mathbb{B}$	Competence .52, Assertiveness .50, Modesty -.41
$\mathbb{F}C$	Anxiety -.69, Depression -.69, Vulnerability -.60
$\mathbb{F}E$	Assertiveness .69, Modesty -.60, Compliance -.55
$\mathbb{F}F$	Gregariousness .63, Positive emotion .45, Excitement seeking .41
$\mathbb{F}G$	Order .75, Fantasy -.46, Achievement .44
$\mathbb{F}H$	Self-consciousness -.57, Modesty -.50, Activity .46
$\mathbb{F}I$	Aesthetics .44, Warmth .30
$\mathbb{F}L$	Trust -.74, Angry hostility .40, Vulnerability .33
$\mathbb{F}M$	Fantasy .67, Ideas .39, Impulsiveness .38
$\mathbb{F}N$	Compliance .46, Angry hostility -.45, Deliberation .40
$\mathbb{F}O$	Self-consciousness .62, Anxiety .57, Vulnerability .48
$\mathbb{F}Q_1$	Actions .46, Values .46, Ideas .44
$\mathbb{F}Q_2$	Gregariousness -.67, Warmth -.43, Dutifulness .36
$\mathbb{F}Q_3$	Feelings -.54, Values -.51, Fantasy -.41
$\mathbb{F}Q_4$	Angry hostility .80, Compliance -.67, Impulsiveness .45

assessing a tendency to be self-reliant and independent, and a preference for avoiding group activities.

The correlations presented in Table 16 provide strong support for the validity of the 15FQ+ primaries that load on the Global Anxiety Factor. Most notably the substantial negative correlations between the 15FQ+ Factor $\mathbb{F}C$ (Emotionally stable) and the NEO PI-R facets Anxiety, Depression and Vulnerability are consistent with the definition of this 15FQ+ primary, with $\mathbb{F}C$ assessing a tendency to be emotionally labile, moody, changeable, and easily affected by feelings. Similarly, the strong correlations between the 15FQ+ Factor $\mathbb{F}O$ (Self-doubting) and the NEO PI-R facets Self-consciousness, Anxiety and Vulnerability are consistent with the definition of this 15FQ+ primary as assessing a proneness to be troubled by sundry worries, and feelings of insecurity and self-doubt. Finally, the substantial correlation between the 15FQ+ Factor $\mathbb{F}Q_4$ (Tense-driven)

and the NEO PI-R facet Angry hostility, provides strong support for the convergent construct validity of this 15FQ+ primary, which assesses an impatient, short tempered and hostile temperament, reflecting a low ability to tolerate frustration.

The correlations presented in Table 16 also provide strong support for the validity of the 15FQ+ primary factors that contribute to the Openness Global Factor. The significant correlation between the 15FQ+ Factor $\mathbb{F}I$ (Tender-minded) and the NEO PI-R facet Aesthetics reflects the fact that high scores on this 15FQ+ primary are associated with an interest in aesthetic, artistic pursuits. Moreover, the modest correlation between $\mathbb{F}I$ and the NEO PI-R facet Warmth is consistent with this scale's definition, with high scores being associated with an openness to emotional experience. Similarly the significant correlations between the 15FQ+ Factor $\mathbb{F}M$ (Abstract) and the NEO PI-R facets Fantasy and Ideas provide further support for the convergent construct validity of this 15FQ+ primary factor, which assesses a tendency to focus on abstract intellectual ideas, fantasy and imagination. Moreover, the modest correlation between $\mathbb{F}M$ and the NEO PI-R facet Impulsiveness is likely to reflect the fact that high scores on this 15FQ+ factor are associated with a tendency to become lost in thought, have a lack of concern for practical matters and an inclination to approach problems in an unrealistic, fanciful manner. As would be expected the 15FQ+ Factor $\mathbb{F}Q_1$ (Radical) correlates significantly with the NEO PI-R facets Actions, Values and Ideas. This reflects the fact that high scores on this 15FQ+ primary are associated with an openness to radical innovation and change.

With regard to the 15FQ+ primary factors that weight on the Global Factor self-Control, the following points are noteworthy. Firstly, the substantial correlation between the 15FQ+ Factor $\mathbb{F}G$ (Conscientious) and the NEO PI-R facet Order, provides strong support for the convergent construct validity of this 15FQ+ primary, which assesses a preference for order and routine and a tendency to be persevering, dutiful and detail-conscious. Secondly, as would be predicted, the 15FQ+ Factor $\mathbb{F}N$ (Restrained) correlates with the NEO PI-R facets Compliance and Deliberation. This reflects the fact that high $\mathbb{F}N$ scores are associated with a tendency to be diplomatic and restrained in social interactions, and deliberating and shrewd when dealing with others. Similarly, the negative correlation

between this 15FQ+ primary factor and the NEO PI-R facet Angry hostility reflects the tendency for people who obtain high scores on this primary to be restrained in their dealings with others and avoid angry, volatile outbursts. Finally, the significant negative correlations between the 15FQ+ Factor $\mathbb{F}Q_3$ (Self-disciplined) and the NEO PI-R facets Feelings, Values and Fantasy is consistent with this primary factor's definition, with this 15FQ+ primary assessing the tendency to be self-disciplined and to maintain high levels of self-control.

The correlations presented in Table 16 also provide strong support for the validity of the 15FQ+ primary factors that weight on the 15FQ+ Agreeableness Global Factor. Most notably the significant positive correlation between the 15FQ+ Factor $\mathbb{F}E$ (Dominant) and the NEO PI-R facet Assertiveness, and its negative correlation with Modesty and Compliance, are consistent with the definition of this 15FQ+ primary. Similarly, the substantial negative correlation between the 15FQ+ Factor $\mathbb{F}L$ (Suspicious) and the NEO PI-R facet Trusting provides strong support for the convergent construct validity of this 15FQ+ primary. Finally, the significant

Table 17: Correlations between the 15FQ+ and the NEO PI-R global factors

15FQ+ Global Factor	r
E Extraversion with NEO-E	.74
N Anxiety with NEO-N	.77
O Openness with NEO-O	.66
A Agreeableness with NEO-A	.61
C self-Control with NEO-C	.67

$p < .001$ for all correlations

Table 18: Correlations between the 15FQ+ global factors and the NEO FFI

15FQ+ Global Factor	r
E Extraversion with NEO-E	.66
N Anxiety with NEO-N	.57
O Openness with NEO-O	.55
A Agreeableness with NEO-A	.59
C self-Control with NEO-C	.69

$p < .001$ for all correlations

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positive correlations between β (Intellectance) and the NEO PI-R facets Competence and Assertiveness, and the negative correlation with Modesty, reflects the fact that this 15FQ+ primary factor assesses a person's confidence in their own intellectual abilities and competencies.

Table 17 presents correlations between the 15FQ+ global factors and the 'Big Five' personality factors as assessed by the NEO PI-R on a sample of 60 undergraduates. Inspection of this table indicates that all these correlations are substantial in size, and all are statistically significant at the 0.1% level. This demonstrates a broad equivalence between the 15FQ+ global factors and the 'Big Five' personality factors as defined by Costa and McCrae (1987).

Table 18 presents correlations between the 15FQ+ global factors and the NEO FFI on a sample of 37 MBA students. Inspection of this table indicates that all these correlations are statistically significant at the 0.1% level, further demonstrating broad equivalence between the 15FQ+ global factors and the 'Big Five' personality factors as defined by Costa and McCrae (1987).

THE RELATIONSHIP BETWEEN THE 15FQ+ AND THE OPQ32i

A sample of 82 employees in a food processing plant in South Africa completed the 15FQ+ and the OPQ32i. Table 19 presents the most significant correlations between these two personality tests. Of the 15FQ+ primaries that weight on the Anxiety Global Factor, β O (Apprehensive) was the primary factor that was found to be best predicted by the OPQ, with the OPQ scale Worrying correlating strongly with this 15FQ+ primary. This is consistent with the definition of this 15FQ+ primary, which assesses a proneness to worry, a lack of self-confidence and a tendency to self-doubt. The other 15FQ+ primaries that weight on the Anxiety Global Factor similarly demonstrated good convergent validity with the OPQ scales, in that all these primaries correlated most strongly with related OPQ dimensions. However, the fact that these correlations were only modest in size indicates that these 15FQ+ primaries are assessing traits that are not fully assessed primary by the OPQ.

The strong negative correlation between the 15FQ+ Factor β Q₁ (Radical), and the OPQ scale Conventional, provides strong

Table 19: Correlations between the OPQ32i and the 15FQ+ factors (n=82)

15FQ+ factor	OPQ scale
β A Empathic	Behavioural (.33), Affiliative (.30)
β Intellectance	Emotionally Controlled (-.43), Worrying (-.43), Modest (-.34)
β C Emotionally Stable	Worrying (-.43), Relaxed (.40), Optimistic (.30)
β E Dominant	Outspoken (.57), Controlling (.51), Modest (-.49)
β F Enthusiastic	Outgoing (.51) Affiliative (.50) Conventional (-.48)
β G Conscientious	Detail Conscious (.48), Variety Seeking (-.43) Conventional (.36), Innovative (-.35)
β H Socially Bold	Emotionally Controlled (-.57), Worrying (-.53), Modest (-.49), Conventional (-.49) Persuasive (.46)
β I Tender-minded	Worrying (.31)
β L Suspicious	Trusting (-.39)
β M Abstract	Detail Conscious (-.38), Conventional (-.36), Innovative (.35), Conceptual (.32)
β N Restrained	Rule Following (.35), Outspoken (-.30)
β O Apprehensive	Worrying (.59), Relaxed (-.45), Conventional (.44), Tough Minded (-.37), Emotionally Controlled (-.36), Socially Confident (-.34),
β Q ₁ Radical	Conventional (-.58), Emotionally Controlled (-.38), Innovative (.37), Rule Following (-.37)
β Q ₂ Self-sufficient	Affiliative (-.54), Rule Following (.44), Democratic (-.41)
β Q ₃ Self-disciplined	Rule Following (.36), Variety Seeking (-.35)
β Q ₄ Tense-driven	Tough Minded (-.37), Relaxed (-.35), Worrying (.30)

support for the convergent construct validity of this 15FQ+ primary. With the exception of this 15FQ+ primary however, there was little convergence between the 15FQ+ primaries that weight on the Openness (to experience) Global Factor and the OPQ scales. This suggests that the other 15FQ+ primaries that weight on this global factor ($\mathbb{F}A$, $\mathbb{F}I$ and $\mathbb{F}M$) are assessing traits that are not fully covered by the OPQ scales.

The 15FQ+ primaries that weight on the Extraversion Global Factor showed good convergence with their associated OPQ scales. The strong positive correlation between the 15FQ+ Factor $\mathbb{F}F$ (Enthusiastic) and the OPQ scale Outgoing, and the negative correlation of the 15FQ+ Factor $\mathbb{F}Q_2$ (Self-sufficient) with the OPQ scale Affiliative, provides good evidence to support the construct validity of these 15FQ+ primaries. The significant negative correlations between the 15FQ+ Factor $\mathbb{F}H$ (Socially Bold) and the OPQ anxiety scales Emotionally Controlled and Worrying is consistent with the definition of this 15FQ+ primary, which assesses a person's concern about their social presentation and a tendency to worry about how others see them (social anxiety). The fact that the OPQ scales Modest and Persuasive also correlated significantly with this 15FQ+ primary is consistent with the definition of this primary as assessing social confidence.

The strong positive correlation between the 15FQ+ Factor $\mathbb{F}E$ (Dominant) and the OPQ scales Outspoken and Controlling, and the substantial negative correlation between this 15FQ+ primary and the OPQ scale Modest, is consistent with the definition of this 15FQ+ primary factor, with more dominant people being more outspoken and controlling, and less modest, than less dominant people. These correlations therefore provide strong support for the convergent construct validity of the 15FQ+ Factor $\mathbb{F}E$ (Dominant).

The significant positive correlation between the 15FQ+ Factor $\mathbb{F}G$ (Conscientious) and the OPQ scale Detail Conscious provides further support for the construct validity of this 15FQ+ primary. The modest negative correlation between this primary and the OPQ scale Variety Seeking, and the modest positive correlation between this 15FQ+ primary and the OPQ scale Conventional, are similarly consistent with the definition of this 15FQ+ primary. In summary these correlations indicate that people who score highly on this primary are attentive to detail, enjoy routine and are conventional in their outlook on life. With the

exception of this 15FQ+ primary, however, there was little convergence between the other 15FQ+ primaries that weight on the Global Factor High self-Control ($\mathbb{F}N$ and $\mathbb{F}Q_3$) and the OPQ scales. This suggests that the 15FQ+ primaries that weight on this global factor are assessing traits that are not fully covered by the OPQ scales.

THE RELATIONSHIP BETWEEN THE 15FQ+ AND THE MBTI®

A sample of 46 course delegates completed the 15FQ+ and the Myers-Briggs Type Indicator (MBTI). The MBTI contains eight scales which assess; Extraversion versus Introversion, Sensing versus iNtuiting, Thinking versus Feeling and Judging versus Perceiving. The correlations between the MBTI scales and the 15FQ+ primary factors are presented in Table 20. (For ease of interpretation correlations of less than .3 are not reported.)

Inspection of this table indicates that these correlations provide good support for the convergent and discriminant construct validity of each of the 15FQ+ primary factors that weight on the Global Extraversion Factor; Enthusiastic ($\mathbb{F}F$), Socially-bold ($\mathbb{F}H$) and Self-sufficient ($\mathbb{F}Q_2$). As would be expected each of these primaries was found to be significantly correlated with both the MBTI Extraversion and Introversion scales, and not to correlate significantly with any of the other MBTI scales.

The 15FQ+ $\mathbb{F}M$ (Factor Abstract) was found to correlate significantly with the MBTI iNtuiting scale, which assesses a preference for viewing life from an abstract, theoretical perspective. This correlation is consistent with the definition of this 15FQ+ primary factor and therefore provides further support for the construct validity of this primary. Only modest correlations were found between the MBTI Thinking and Feeling scales and the 15FQ+ factors, with this reflecting the fact that this construct is specific to the MBTI and shares little common variance with any of the 15FQ+ primaries.

Finally the 15FQ+ Factor Conscientious ($\mathbb{F}G$) was found to be correlated significantly with both the Judging and Perceiving scales of the MBTI, with these MBTI scales assessing a preference for attending to the detailed requirements of a task rather than focusing on the broader picture. Moreover, this primary did not correlate significantly with any of the other MBTI scales, proving good evidence of the convergent and discriminant construct validity of this 15FQ+ primary factor.

Table 20: Correlations between the 15FQ+ factors and the MBTI scales

	E	I	S	N	T	F	J	P
fA								
β					.34	-.34		
fC								
fE								
fF	.66	-.86						
fG							.52	-.69
fH	.46	-.72						
fI						.39		
fL								
fM				.57				
fN								
fO								
fQ ₁								
fQ ₂	-.33	.60						
fQ ₃								
fQ ₄								
SD								

THE RELATIONSHIP BETWEEN THE 15FQ+ AND THE JUNG TYPE INDICATOR

Table 21 presents correlations between the 15FQ+ primary factors and the four personality dimensions assessed by the JTI, on a sample of 57 MBA students. (Correlations of less than .3 have been excluded from this table to facilitate the interpretation of these results.) Inspection of this table indicates that each of the 15FQ+ primaries that weight on the Extraversion Global Factor correlate substantially with the Extraversion-Introversion dimension of the JTI, providing strong support for the convergent (construct) validity of these 15FQ+ primaries. Moreover, the correlation between the 15FQ+ Factor fE (Dominant) and the JTI dimension Extraversion-Introversion indicates, not surprisingly, that people who are more dominant also tend to be more extraverted. Thus this finding is consistent with the definition of Factor fE, providing further support for the validity of this 15FQ+ primary. Similarly, the correlation between the 15FQ+ Factor fL (Suspicious) and the JTI dimension Extraversion-Introversion suggests that people who are suspicious by nature are likely to be more manipulative in interpersonal

relationships than are more trusting people, and hence are likely to be more extraverted than are more trusting people. Thus, this correlation is consistent with the definition of Factor fL. Finally, the modest correlation between Factor fC and the Extraversion-Introversion dimension of the JTI is likely to reflect the commonly observed finding that extraverts tend to be more emotionally stable than introverts.

The substantial correlations between the 15FQ+ Factors fI (Tender-minded) and fM (Abstract), with the Sensing-Intuiting dimension of the JTI provides strong support for the convergent construct validity of these two 15FQ+ primaries. This reflects the fact that the SN dimension of the JTI assesses an interest in aesthetic and artistic matters, and a preference for focusing on abstract ideas and imagination versus focusing on hard facts and objective reality.

The substantial correlation between the 15FQ+ Factor fA (Empathic) and the JTI dimension Thinking-Feeling provides strong support for the convergent construct validity of this 15FQ+ factor, as both of these dimensions assess an empathic concern for others and a sensitivity to other's feelings. Moreover, the finding that 15FQ+ Factors fI (Tender-minded) and fM (Abstract) also correlate significantly with this JTI dimension provides further support for these 15FQ+ primary

Table 21: Correlations between the 15FQ+ and the JTI

	EI	SN	TF	JP
fA	.52	-	-.53	-
β	-	-	-	-
fC	.38	-	-	-
fE	.39	-	-	-
fF	.68	-	-	-
fG	-	-	-	.78
fH	.62	-.37	-	-
fI	-	-.55	-.46	-
fL	.47	.32	.45	-
fM	-	-.68	-.43	-
fN	-	-	-	-
fO	-	-	-	-
fQ ₁	-	-.33	-	-
fQ ₂	.48	-	-	-
fQ ₃	-	-	-	-.46
fQ ₄	-	-	-	-

n=57 all correlations are significant at the 5% level or less

factors as both of these primaries assesses an individual's emotional and psychological openness. Finally the significant correlation between the 15FQ+ Factor $\mathcal{F}L$ (Trusting) and JTI dimension Thinking-Feeling, reflects the fact that more emotionally sensitive people are likely to be more trusting and open in interpersonal relationships. Thus this significant correlation provides further support for the validity of this 15FQ+ primary.

The large correlation between the 15FQ+ Factor $\mathcal{F}G$ (Conscientious) and the JTI dimension Judging-Perceiving provides strong support for the validity of this 15FQ+ primary, as both of these dimensions assess a preference for order, neatness and structure. Similarly, the significant correlation between the 15FQ+ Factor $\mathcal{F}Q_3$ (Self-disciplined) and the JTI dimension Judging-Perceiving is consistent with the definition of this 15FQ+ primary, as both of these personality dimensions assess the tendency to set oneself high standards of personal conduct and place great weight on social expectations and norms. Moreover, the failure of these 15FQ+ primaries to weight on any other JTI dimensions, provides good evidence of the discriminant validity of these 15FQ+ factor primary factors.

THE RELATIONSHIP BETWEEN THE 15FQ+ AND THE EPQR

A sample of 112 undergraduates completed both the 15FQ+ and the EPQR as part of a test validation exercise. As can be seen from Table 22, the EPQR Extraversion and Neuroticism scales showed good concordance with each of their respective 15FQ+ primary factors. EPQR Extraversion correlated substantially with the 15FQ+ primary factors; Enthusiastic ($\mathcal{F}F$), Socially-bold ($\mathcal{F}H$) and Group-orientated ($\mathcal{F}Q_2$). This provides strong support for the convergent construct validity of each of these 15FQ+ primaries. EPQR Neuroticism similarly correlated strongly with each of the related 15FQ+ primary factors; Affected by Feelings ($\mathcal{F}C$), Apprehensive ($\mathcal{F}O$) and Tense-driven ($\mathcal{F}Q_4$). This likewise provides strong support for the convergent construct validity of these 15FQ+ primaries. Moreover, the strong correlation between the EPQR Empathy scale and the 15FQ+ Factor $\mathcal{F}A$ (Empathic) provides strong support for the convergent validity of this 15FQ+ primary.

Psychoticism did not correspond with any of the 15FQ+ primary factors, as would be expected, providing support for the divergent validity of the 15FQ+ primaries. There

was, however, a slight tendency for people scoring higher on psychoticism to be less Self-disciplined and more Dominant, as might be expected given the definition of these 15FQ+ primaries.

There was a strong correlation between the 15FQ+ Social Desirability dimension and the EPQR Lie Scale (which assesses social desirability), thereby providing good support for the convergent validity of this 15FQ+ scale. Moreover, the significant correlation between the EPQR Lie Scale and the 15FQ+ primary factor Self-disciplined ($\mathcal{F}Q_3$), reflects the fact that high $\mathcal{F}Q_3$ scores are associated with an adherence to a strong moral code. As such, respondents who score highly on this 15FQ+ primary are unlikely to freely agree with the items on the EPQR Lie Scale; which assess social desirability via an individual's willingness to admit to a range of minor moral transgressions and peccadilloes that are common among many people. Thus this correlation provides further support for the construct validity of this 15FQ+ primary.

As would be expected, there were few substantial correlations between the EPQR Impulsivity and Venturesomeness scales, and any of the 15FQ+ primary factors, providing support for the divergent construct validity of the 15FQ+ primaries. However, the modest (but statistically significant) positive correlation between Venturesomeness and 15FQ+ Intellectance, and the modest (but statistically significant) negative correlation between Neuroticism and Intellectance, are consistent with the observation that confidence in one's own intellectual abilities is associated more generally with self-confidence. These correlations therefore provide some support for the construct validity of this 15FQ+ scale.

THE RELATIONSHIP BETWEEN THE 15FQ+ AND THE PPQ

A sample of 103 volunteers completed both the 15FQ+ and the PPQ as part of a test validation exercise. The PPQ was constructed by Prof. Paul Kline and is based on the Five Factor Model of personality popularised by Costa and McCrae (1985). The correlations between these two tests are presented in Table 23 ($r > .3$).

As would be predicted, the PPQ dimension Insecure was most strongly correlated with the 15FQ+ primary factors that weight on the Anxiety Global Factor; Affected by Feelings ($\mathcal{F}C$), Apprehensive ($\mathcal{F}O$) and Tense-driven ($\mathcal{F}Q_4$). As such these correlations provide

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support for the convergent construct validity of these 15FQ+ primaries. The somewhat smaller, but nonetheless significant correlations between the PPQ scale Insecure and the 15FQ+ Factors Intellectance (β), Dominant (β E) and Socially-bold (β H) reflect the fact that each of these 15FQ+ primaries is associated social confidence and, as a result, these 15FQ+ factors would be expected to correlate modestly with scales that measure anxiety (lack of self-confidence). Therefore these correlations are not inconsistent with the definition of these 15FQ+ primary factors.

The PPQ Extraversion scale was most strongly correlated with the 15FQ+ primary factors that weight on the Extraversion Global Factor; Enthusiastic (β F), Socially-bold (β H) and Group-orientated (β Q₄). This pattern of relationships would be expected, providing support for the convergent construct validity of these 15FQ+ primary factors. The PPQ Conscientious scale was most strongly correlated with the 15FQ+ primary Conscientiousness (β G), providing support for the validity of this primary.

Surprisingly, there was little correspondence between any of the 15FQ+ primaries that contribute to the Openness Global Factor and the corresponding PPQ dimension, Unconventionality. The reasons for this are unclear. While the lack of any association between these scales does not directly call into question the validity of these 15FQ+ primaries, these results similarly do not provide any support for the convergent construct validity of these 15FQ+ primary factors.

THE RELATIONSHIP BETWEEN THE 15FQ+ AND THE OPPro

A sample of 274 applicants completed both the 15FQ+ and the Occupational Personality Profile (OPPro) as part of a selection process with a number of different organisations. Table 24 presents the correlations ($r > .3$) between these two tests.

It can be seen from this table that the OPPro Assertive dimension correlated significantly with the 15FQ+ Factors Dominant (β E) and Direct (β N), providing good support for the convergent construct validity of these two primaries. The OPPro dimension Detail-conscious correlated substantially with the 15FQ+ primaries Conscientious (β G) and Conventional (β Q₁), and to a lesser extent with the 15FQ+ primary Self-disciplined (β Q₃). These correlations are consistent with the definitions of each of these

15FQ+ primaries and therefore provide good support for the convergent construct validity of these 15FQ+ primary factors. The OPPro dimension Trusting correlated highly with its 15FQ+ counterpart (β L), similarly providing strong support for the construct validity of this 15FQ+ factor.

As would be expected, the Phlegmatic dimension of the OPPro correlated substantially with each of the 15FQ+ primary factors that weight on the Anxiety Global Factor; Emotionally stable (β C), Self-assured (β O) and Composed (β Q₂). Similarly, as would be predicted, the OPPro dimension Gregarious, which measures extraversion, correlated substantially with each of the 15FQ+ primary factors that weight on the Extroversion Global Factor; β A (Empathic), β F (Enthusiastic), β H (Socially Bold) and β Q₂ (Group Oriented). The OPPro dimension Persuasive was most strongly related with the 15FQ+ primaries Enthusiastic (β F) and Socially-bold (β H), which are clearly two important traits in determining a person's persuasive powers. The correlations between each of the 15FQ+ primary factors that load on the Extraversion and Anxiety global factors, and their associated OPPro dimensions, therefore provide strong support for the convergent construct validity of each of these 15FQ+ primary factors.

The OPPro dimension Contesting, which assesses the Type A personality pattern, correlated substantially with the 15FQ+ Factor Tense-driven (β Q₄), as well as correlating (not surprisingly) with the 15FQ+ Factor Suspicious (β L). This is consistent with the definition of each of these primaries and therefore provides further support for the construct validity of these 15FQ+ primary factors.

The OPP dimension External, which measures Locus of Control, was not strongly correlated with any of the 15FQ+ primaries. This is to be expected given that this scale was derived from social learning theory and assesses a cognitive style rather than a personality trait. The lack of any strong correlations between the 15FQ+ primaries and this OPPro dimension therefore demonstrates the discriminate construct validity of the 15FQ+ factors. However, its modest association with a cluster of 15FQ+ primary factors that load on the Anxiety Global Factor – Tense-driven (β Q₄), Apprehensive (β O) and Suspicious (β L) – reflects the finding that individuals who have an External Locus of Control lack self-confidence and are prone to worry and self-

Table 22: Correlations between the 15FQ+ global factors and the EPQR

	Psychoticism	Extraversion	Neuroticism	Lie Scale (Social- Desirability)	Impulsivity	Venture- someness	Empathy- Sensitivity
fA			-.31				.58
β			-.35			.40	
fC			-.58				
fE	.40	.34				.38	-.33
fF		.71			.31	.34	
fG				.31			
fH		.58	-.31				
fI						-.24	
fL			.30				-.36
fM							
fN		-.31			-.41		
fO			.68				.36
fQ ₁							
fQ ₂		-.69					
fQ ₃	-.31			.41			
fQ ₄			.48				
SD				.56			

Table 23: Correlations between the 15FQ+ factors and the PPQ scales

	Insecure	Tender	Extraversion	Conscientiousness	Unconventionality
fA		.57	.27		
β	-.38				
fC	.52				
fE	-.31	.39	.38		
fF	-.34		.51		
fG				.52	
fH	-.39		.45		
fI	-.36				
fL					
fM					.38
fN					
fO	.58				
fQ ₁				-.42	.31
fQ ₂			-.58		
fQ ₃				.31	-.39
fQ ₄	.46				
SD					

doubt. These modest correlations are therefore consistent with the definition of these 15FQ+ primaries and provide further support for the construct validity of these primaries. As would be expected, the OPPro dimension Pragmatic – which assess open-mindedness – was strongly correlated with the each of the 15FQ+ primary factors that weight on the Openness (to experience) Global Factor; Abstract (fM), Tender-minded (fI) and Radical (fQ_1). These correlations therefore provide strong support for the convergent construct validity of these 15FQ+ primary factors.

THE RELATIONSHIP BETWEEN THE 15FQ+ AND THE OIP+

A sample of 48 adults completed the 15FQ+ and the Occupational Interest Profile Plus (OIP+) as part of a careers guidance process. The OIP+ assesses eight career interests and eight personal work needs. While few substantial correlations would be expected between the OIP+ career interest scales and the 15FQ+ primary personality factors, a consistent pattern of small correlations between occupational interests and the 15FQ+ primaries would be expected given the well demonstrated (but modest) associations that are known to exist between personality and work interests. Moreover, as five of the eight personal work needs assessed by the OIP+ measure facets of the 'Big Five' personality factors, a number of the personal work needs that are assessed by the OIP+ would be expected to be substantially correlated with some of the 15FQ+ primaries. Table 25 presents the significant correlations ($r > .3$) that were found between these two tests.

Most significantly the 15FQ+ primaries that weight on the Extraversion Global Factor

– fF (Enthusiastic), fH (Socially-bold) and fQ_2 (Self-sufficient) – were found to be correlated substantially with the OIP+ Extraversion scale. Similarly, the 15FQ+ Factors fC (Emotionally Stable) and fO (Apprehensive) correlated substantially with the OIP+ Stability scale. The modest correlation between the OIP+ Stability scale and the 15FQ+ Factor fQ_4 (Tense-driven) probably reflects the fact that this 15FQ+ primary is not a simple measure of emotional stability, but rather assesses frustration tolerance and the tendency to become short tempered and irritable when confronted with frustrations. The pattern of correlations noted above is therefore consistent with the definitions of the 15FQ+ primary factors that weight on the Extraversion and Anxiety global factors and thus provides further support for the construct validity of these primaries.

The strong correlation that was observed between the 15FQ+ Factor fE (Factor Dominant) and the Managerial occupational interest scale is consistent with the definition of this 15FQ+ primary. This OIP+ scale assesses an interest in managing people and giving directions and instructions to others, with people who score highly on this OIP+ occupational interest indicating that they feel comfortable telling people what to do and taking the lead. Similarly, the significant negative correlation between the 15FQ+ Factor fL (Suspicious) and the OIP+ scale Agreeableness is consistent with both of these scale's definitions, with this OIP+ scale assessing a cynical attitude towards life and a tendency to question other's motives. Finally, the substantial correlation between the 15FQ+ Factor fM (Abstract) and the OIP+

Table 24: Correlations ($r > .3$) between the 15FQ+ factors and the OPPro scales

OPPro scales	15FQ+ factors (correlations in parentheses)
Assertive	fE Dominant (.65), fN Restrained (-.45), fH Socially bold (.30)
Detail-conscious	fG Conscientious (.57), fQ_1 Radical (-.42), fQ_3 Self-disciplined (.35)
Trusting	fL Suspicious (-.68), fA Empathic (.35), fQ_3 Self-disciplined (-.32)
Phlegmatic	fC Emotionally stable (-.64), fO Apprehensive (-.58), fQ_4 Tense-driven (-.44)
Gregarious	fQ_2 Self-sufficient (-.66), fH Socially Bold (.54), fF Enthusiastic (.47)
Persuasive	fH Socially Bold (.56), fF Enthusiastic (.45), fQ_2 Self-sufficient (-.35)
Contesting	fQ_4 Tense-driven (.64), Apprehensive (.33), fL Suspicious (.30)
External (locus of control)	fO Apprehensive (.36), fI Tender-minded (.29)
Pragmatic	fM Abstract (-.64), fI Tender-minded (-.56), fQ_1 Radical (.45)

Table 25: Correlations ($r > .3$) Between the 15FQ+ factors and the OIP+ scales

15FQ+ factor	OIP+ scale
fA Empathic	Scientific (-.46), Logical (-.32), Agreeable (.38)
fB Intellectance	Managerial (.44)
fC Emotionally Stable	Stability (.64), Scientific (.43), Logical (.43), Extraversion (.35)
fE Dominant	Managerial (.68), Extraversion (.43)
fF Enthusiastic	Extraversion (.60), Persuasive (.36), Nurturing (-.33)
fG Conscientious	Conscientiousness (.67), Artistic (-.48), Stability (-.35)
fH Socially Bold	Extraversion (.65), Persuasive (.53), Stability (.48)
fI Tender-minded	Logical (.51), Artistic (.35)
fL Suspicious	Agreeableness (-.77)
fM Abstract	Openness (.73), Artistic (.50), Administrative (-.37)
fN Restrained	Administrative (.41), Managerial (-.35), Extraversion (-.35)
fO Apprehensive	Stability (-.63), Persuasive (-.11)
fQ_1 Radical	Persuasive (.43), Extraversion (.31), Optimistic (.31)
fQ_2 Self-sufficient	Extraversion (-.65), Optimistic (-.47)
fQ_3 Self-disciplined	Optimistic (-.42)
fQ_4 Tense-driven	Stability (-.32)

scale Openness is noteworthy. This OIP+ scale assesses an openness to new ideas and experiences, with people who score highly on this OIP+ scale expressing a strong interest in abstract theoretical ideas and a tendency to take an academic intellectual approach to problem solving. As such, this correlation provides strong support for the convergent construct validity of this 15FQ+ primary factors.

THE RELATIONSHIP BETWEEN THE 15FQ+ AND EMOTIONAL INTELLIGENCE (EI)

Tables 26a and 26b present respectively, correlations between the 15FQ+ primary factors and the emotional intelligence dimensions assessed by the Bar-on Emotional Quotient Inventory (EQI) and the Emotional Competencies Inventory (ECI). Inspection of these tables demonstrates the ability of the 15FQ+ to predict EI, as well as providing further evidence to support the construct validity of the 15FQ+.

With regard to the data presented in Table 26a, most notable are the substantial correlations of the 15FQ+ primaries fA (Empathic), with the Bar-on dimension Empathy, and fE (Dominant) with the Bar-on dimension Assertiveness. These correlations provide clear support

for the convergent construct validity of these 15FQ+ primary factors.

The substantial negative correlation between the 15FQ+ Factor fQ_4 (Tense-driven) and the EQI dimension Impulse Control, similarly provides support for convergent construct validity of this 15FQ+ primary, demonstrating that high fQ_4 scores are associated with a low level of frustration tolerance and a tendency for temper outbursts. Moreover, the significant correlation between the Bar-on dimension Stress tolerance and the 15FQ+ primary fC (Emotionally Stable) is consistent with this factor's definition, as is the negative correlation between Factor fO (Self-doubting) and the EQI dimension Optimism.

Likewise, the significant correlation between the 15FQ+ Factor fQ_1 (Self-disciplined) and the Bar-on dimension Independence, is consistent with this factor's definition as assessing a tendency to be radical, experimenting and independent of mainstream views and opinions. These correlations therefore provide good evidence of the convergent construct validity of these 15FQ+ primaries.

The significant correlation between

the 15FQ+ primary *f*G (Conscientious) and the Bar-on dimension Problem Solving reflects the fact that this latter dimension assesses a tendency to adopt a planful, systematic approach to problem solving – providing further support for the construct validity of this 15FQ+ primary.

Likewise, the significant correlation between the 15FQ+ Factor *f*I (Tender-minded) and the EQI dimension Self-actualisation, reflects the fact that this latter dimension assesses a person's desire to seek self-actualisation and personal growth through (amongst other things) an interest in aesthetic and cultural activities, thereby providing support for validity of this 15FQ+ primary. Moreover, the significant correlations between the 15FQ+ Factor *f*N (Restrained) and the Bar-on dimensions of Social Responsibility and Impulse Control is consistent with the definition of this 15GQ+ primary factor, which assesses a discreet, diplomatic, shrewd awareness of social expectations.

With regard to the data presented in Table 26b most notable are the large correlations between the ECI scale Relationship Skills and the

15FQ+ primaries *f*F (Enthusiastic) and *f*H (Socially Bold). This demonstrates that social confidence and interpersonal enthusiasm are core components of good relationship skills.

The substantial correlation between the ECI scale Empathy and the 15FQ+ primary *f*A (Empathic), demonstrates the ability of 15FQ+ to predict this core EI construct. That the 15FQ+ primaries *f*F and *f*H are also strongly correlated with Empathy, indicates that higher levels of empathy are also associated with higher levels of social skills.

The large negative correlation between the ECI scale Self Control and the 15FQ+ primary *f*O (Self-doubting) indicates that those individuals who have greater control over their emotions have higher levels of self-confidence, as would be expected. Similarly the substantial correlation between this ECI scale and the 15FQ+ primary *f*N (Restrained), indicates that Self Control is, not surprisingly, associated with interpersonal restraint.

That the ECI scale Assertiveness does not correlate with the 15FQ+ primary Dominant (*f*E) is to be expected, as this ECI dimension assesses appropriate assertion whereas *f*E assesses the tendency for someone to dominate social situations. We would therefore expect there to be a curvilinear relationship between appropriate assertion and the 15FQ+ primary *f*E. That is, average scores on this primary will be associated with appropriately assertive behaviours, with high and low scores being associated with passivity and aggression respectively. The substantial correlations between the 15FQ+ primaries *f*F and *f*H with the ECI scale Assertiveness, supports this idea; indicating that appropriate assertion is associated with a higher level of social skill.

Table 26: Correlations between the 15FQ+ and the Emotional Quotient Inventory.

Scale	15FQ+ Factors
Emotional self-awareness	<i>f</i> A (.51) <i>f</i> I (.36) <i>f</i> N (.40) <i>f</i> Q ₄ (.38)
Assertiveness	<i>f</i> B (.36) <i>f</i> E (.53) <i>f</i> H (.34) <i>f</i> Q ₁ (.36)
Self-regard	<i>f</i> C (.52) <i>f</i> O (-.52) <i>f</i> Q ₄ (-.39)
Self-actualisation	<i>f</i> A (.48) <i>f</i> I (.44)
Independence	<i>f</i> E (.48) <i>f</i> O (-.31) <i>f</i> Q ₁ (.36)
Empathy	<i>f</i> A (.66) <i>f</i> N (.36)
Interpersonal Relationships	<i>f</i> A (.55) <i>f</i> N (.41)
Social responsibility	<i>f</i> A (.52) <i>f</i> N (.45)
Problem solving	<i>f</i> A (.33) <i>f</i> G (.39) <i>f</i> N (.31)
Reality testing	<i>f</i> A (.41) <i>f</i> C (.42) <i>f</i> N (.36)
Flexibility	No 16PF scales correlate
Stress tolerance	<i>f</i> C (.48)
Impulse control	<i>f</i> N (.52) <i>f</i> Q ₄ (.68)
Happiness	<i>f</i> A (.39) <i>f</i> C (.39) <i>f</i> F (.41) <i>f</i> Q ₂ (.32)
Optimism	<i>f</i> O (.49)

Table 26b: Correlations between the 15FQ+ and the ECI

ECI scale	15FQ+ primary
Self Awareness	<i>f</i> F (.38) <i>f</i> O (-.35) <i>f</i> A (.34)
Self Reliance	<i>f</i> Q3 (.35)
Assertiveness	<i>f</i> F (.42) <i>f</i> H (.44) <i>f</i> Q2 (-.34) <i>f</i> Q3 (.35)
Relationship Skills	<i>f</i> A (.42) <i>f</i> C (.35) <i>f</i> F (.60) <i>f</i> H (.67) <i>f</i> Q2 (-.42)
Empathy	<i>f</i> A (.56) <i>f</i> C (.35) <i>f</i> F (.60) <i>f</i> H (.67) <i>f</i> Q4 (-.44)
Self Control	<i>f</i> L (-.37) <i>f</i> N (.47) <i>f</i> O (-.55) <i>f</i> Q4 (-.44)
Flexibility	<i>f</i> A (.37) <i>f</i> L (-.36) <i>f</i> Q4 (-.50)
Optimism	<i>f</i> F (.38) <i>f</i> O (-.39)

The moderate, but nonetheless significant correlations between the ECI dimension Optimism and the 15FQ+ primaries fF (Enthusiastic) and fO (Self-doubting), indicate that optimism is associated with a fun-loving interpersonal style and with self-confidence, as would be expected. Finally the moderate correlation between the ECI scale flexibility, and the 15FQ+ primaries fA (Empathic), fL (Suspicious) and $fQ4$ (Tense-driven) reflect the fact that this ECI dimension is assessing interpersonal flexibility, rather than a flexible thinking style. Therefore it is unsurprising to discover that interpersonal flexibility is associated with a tendency to relate to others in a trusting, empathic and composed way.

THE RELATIONSHIP BETWEEN THE 15FQ+ GLOBAL FACTORS AND LEARNING STYLES

As part of a research study to investigate the relationship between learning styles and personality, a sample of 144 undergraduate students (109 female, 35 male) at a UK university completed the 15FQ+ and the revised Approaches to Learning Questionnaire (Duff, 1997). Consistent with the researcher's expectations, Deep Approach was found to be positively correlated with both the Extraversion ($r=.21$) and Openness Global Factors ($r=.34$) and negatively correlated with the Anxiety Global Factor ($r=-.18$).

Surface Approach was found to be positively correlated with the Anxiety ($r=.44$) and Agreeableness ($r=.21$) global factors. Finally, Strategic Approach was found to be positively correlated with the Extraversion ($r=.38$) and self-Control ($r=.42$) Global Factors and negatively correlated with the Anxiety Global Factor ($r=-.24$).

Although not the focus of the study, the researchers found a small positive ($r=.14$) correlation between the self-Control Global Factor and academic success and a small negative ($r=-.16$) between the Anxiety Global Factor and academic success. This is consistent with the commonly observed finding that conscientiousness and stability are related to academic performance.

RELATIONSHIP BETWEEN INTELLECTANCE (B) AND REASONING ABILITY

Unlike Factor B of the 16PF, the Intellectance scale of 15FQ+ is not a measure of reasoning ability. Instead, Intellectance (B) is a metacognitive personality trait, which assesses how confident a person is in their intellectual ability. What then is the relationship between a person's confidence in their ability and their measured ability? To investigate this, the relationship between Intellectance and reasoning ability was examined using a variety of reasoning tests on a number of different samples. These data are presented in Table 28, along with the correlations between Intellectance and Factor B on the 16PF4 and 16PF5, that were obtained from the construct validity studies reported earlier. Taking all these data into account, the results indicate that there is a modest positive relationship between intellectual self-confidence and ability, as measured by a variety of reasoning tests. However, this association is not strong, with these correlations being in the order of .3.

As a final observation on the relationship between Intellectance and intellectual ability it is interesting to note that performance on the final assessment for the BPS Level B certificate in competence in occupational testing was modestly correlated (0.31) with this 15FQ+ scale.

Table 27: Correlations between 15FQ+ and approaches to learning and academic success (n=144)

	Deep Approach	Surface Approach	Strategic Approach	Academic Success
I Extraversion	.214*	-.084	.384†	.030
II Neuroticism	-.178*	.442†	-.241†	-.140
III Openness	.341†	-.033	.179*	.063
IV Agreeableness	-.175*	.209*	-.072	.092
V Conscientiousness	.191*	-.025	.422†	.142
EQI	.237†	-.374†	.268†	.135
WA	.154	.085	.394†	.135

* $p < 0.01$

† $p < 0.01$

Table 28: Relationship between Intellectance and Reasoning Ability

GRT2 (n=28)	GRT1 (n=34)	CRTB2 (n=32)	ART (n=132)	16PF (n=183)
VR2 .10	VR1 .29	VCR2 .32	ART .32	16PF4-B .10
NR2 .38	NR1 .20	NCR2 .12		16PF5-B .34
AR2 .23	AR1 .27			

THE RELATIONSHIP BETWEEN THE 15FQ+ eIQ SCALE AND THE BAR-ON EQ-i

The Bar-on Emotional Quotient Inventory is reported to be the first scientifically developed and validated measure of emotional intelligence. Consisting of 133 items, and taking approximately 30 minutes to complete, the Bar-on provides an overall emotional intelligence score (EQ-i) as well as scores for five composite scales and 15 subscales.

The Bar-on EQ-i measure was used as the criterion for validation of the 15FQ+ Emotional Intelligence criterion keyed scale. The 15FQ+ scale was administered to a sample of 62 undergraduate students who also completed the Bar-on measure of emotional intelligence (EQ-i). The correlation between the 15FQ+ eIQ scale and the Bar-on EQ-i scale was 0.80 (corrected $r=1$), demonstrating an exceptionally high degree of convergent validity when compared to this well validated measure of emotional intelligence.

THE RELATIONSHIP BETWEEN THE 15FQ+ WORK ATTITUDE SCALE AND WORK BEHAVIOUR

In order to examine the validity of the criterion keyed Work Attitude scale this 15FQ+ scale was correlated with the Absa Work Habits and Attitudes Questionnaire (WHAQ). The WHAQ was commissioned by ABSA, South Africa's largest banking group, whose aim was to recruit honest, high calibre staff with a positive work ethic and high level of personal integrity.

The 15FQ+ and WHAQ were administered to a sample of 196 UK undergraduates. The correlation between the overall WHAQ Integrity score and the 15FQ+ Work Attitude scale was 0.52, demonstrating a high degree of construct validity when compared to a comparable measure of integrity.

The construct validity of the 15FQ+ Work Attitude Scale was further examined by correlating this scale with a checklist of acts of delinquency and counterproductive workplace behaviour. The 15FQ+ (criterion keyed) Work Attitude Scale correlated 0.61 with this checklist, demonstrating convergence between the 15FQ+ Work Attitude Scale and reported acts of dishonest behaviour. This substantial correlation therefore provides further support for the construct validity of this criterion referenced scale.

CRITERION VALIDITY OF THE 15FQ+

PREDICTING THE PERFORMANCE OF TELESales STAFF

The year end sales performance of telesales staff ($n=48$) was rated by their line manager on a five-point scale, defined as: excellent; good; average; below average or poor. 15FQ+ scores were obtained as part of the selection and assessment procedure, prior to staff taking up their telesales post.

A step-wise multiple regression indicated that four of the 15FQ+ primary factors predicted sales performance ($R=.42$). Inspection of Table 29, which presents the results of the step-wise multiple regression, indicates that those sales staff who were rated as being more effective were more Socially-bold (fH), less Self-doubting (fO) and more Emotionally Stable (fC) than those who were rated as being less effective. In this regard it is noteworthy that the 15FQ+ Factor Social-boldness (fH) assesses social confidence, and Self-doubting (fO) assesses a tendency to brood over failures and setbacks. This suggests that these two factors are assessing the ability to cope with the interpersonal rejection that is a feature of a telesales environment. Thus, these correlations indicate the importance of the ability to cope effectively with stress, for staff working in this high pressured environment. Moreover, the 15FQ+ Factor Conscientious (fG) was also found to be significantly correlated with rated sales performance, reflecting the importance of accurately completing documentation and reliably following procedures. These four personality factors accounted for just under 20% of the variance in rated sales performance, clearly demonstrating the predictive criterion validity of the 15FQ+.

PREDICTING MANAGERIAL PERFORMANCE (OIL INDUSTRY)

A group of 123 managers working in the oil industry in an international setting (all of whom were native English speakers) completed the 15FQ+ as part of an assessment centre exercise. The significant correlations that were observed between each of the 15FQ+ primary factors and each of the assessed competencies are reported in Table 30.

Inspection of Table 30 reveals a number of modest, but psychologically meaningful correlations between the 15FQ+ primary factors and the rated competencies. Most

significantly low dominance ($-ve fE$) and low social-boldness ($-ve fH$) were associated with a tendency to avoid conflict, discord and disagreement in group exercises. Moreover, the 15FQ+ Factor Socially-bold (fH) was also found to be correlated with better communication skills. Not surprisingly, those candidates who were rated as being more collaborative scored lower on the 15FQ+ Factor Self-sufficient (fQ_2 ; i.e. were more Group-orientated) than those who were rated as being less collaborative. Rated leadership ability was found to be correlated with the 15FQ+ Factors Empathy (fA) and Emotional Stability (fC). Finally, a more strategic approach to thinking and problem solving was found to be associated with higher scores on the 15FQ+ Intellectance (B) scale and on Factor fM (Abstract). These correlations clearly demonstrate the predictive power of the 15FQ+ and provide further evidence of the concurrent criterion validity of this test.

PREDICTING ABSENCE DUE TO ILL HEALTH

125 senior technicians in the power distribution industry completed the 15FQ+ as part of the assessment and selection process. Their sickness record was reviewed after they had been in post for two years, and the number of days sick-leave they had taken over that period was correlated with their 15FQ+ scores. Two 15FQ+ primary factors (fC , Emotionally Stable and fO , Self-doubting) were found to correlate significantly ($p<.05$) with the number of days sick-leave taken ($r=-.33$ and $r=.28$ respectively), with the less emotionally stable and more self-doubting staff taking more sick leave than the more emotionally stable and more confident staff. These results not only provide strong support for the predictive criterion validity of the 15FQ+, but also clearly demonstrate its utility for aiding selection and assessment decisions in ways that are likely to have an impact on bottom line profitability.

PREDICTING THE PERFORMANCE OF POLICE OFFICERS

As part of a masters degree research project on the relationship between personality and occupational performance, 134 New Zealand police officers completed the 15FQ+, as well as providing self-ratings of their job performance. In addition global performance ratings were obtained for a sub-sample of

Table 29: Multiple Regression results for the prediction of the sales performance of staff working in telesales

15FQ+ Factor	Beta weight	p-level
β H Socially-bold	-.39	$p < .01$
β O Self-doubting	-.38	$p < .05$
β C Emotionally Stable	.31	$p < .05$
β G Conscientious	.31	$p < .05$

Table 30: Significant correlations between the 15FQ+ factors and rated competencies

Competency	15FQ+ factor
Collaborating	Self-sufficient (β Q ₂) -.34
Avoiding	Dominant (β E) -.45, Socially-bold (β H) -.39
Communication	Socially-bold (β H) .31
Leadership	Empathic (β A) .32, Emotionally Stable (β C) .28
Strategic Thinking	Intellectance (β) .31 Abstract (β M) .29

Table 31: Correlations between the rated performance of New Zealand police officers and the 15FQ+ primary factors

15FQ+ Factor	Correlation	p-level
β C Emotionally Stable	.37	$p < .01$
β O Self-doubting	-.34	$p < .01$
β Q ₄ Tense-driven	-.33	$p < .01$
β G Conscientious	.32	$p < .01$
β L Suspicious	-.27	$p < .05$

53 police officers at their subsequent annual performance review. Table 31 presents the statistically significant correlations between the 15FQ+ primaries and self-rated performance.

Inspection of this table indicates that each of the 15FQ+ primaries (β C, β L, β O and β Q₄) that weight on the Anxiety Global Factor were found to be significantly correlated with performance, with those police officers who had lower levels of anxiety reporting performing more effectively in this stressful role. In addition, the 15FQ+ Factor β G (Conscientious) was also found to be correlated with self-reported performance, indicating that success as a police officer is associated with a tendency to be more detail conscious, planful and diligent. Finally, the 15FQ+

primary β Q₄ (Tense-driven) was found to correlate significantly ($r = -.38$, $p < .01$) with the officer's performance, as rated at their annual performance appraisal, with those police officers who performed better in their job being less tense and impatient, and being better able to tolerate frustration, than those whose performance was poorer. These data therefore provide evidence of both the concurrent and predictive criterion validity of the 15FQ+, demonstrating the utility of this test in predicting job performance.

PREDICTING MANAGERIAL PERFORMANCE (FINANCIAL SERVICES)

The 15FQ+ was used in a major international financial services company to predict the performance and potential of senior, middle and general managers. 150 managers completed the 15FQ+ and were rated in terms of both their current performance and their potential. The 15FQ+ Factor Suspicious ($\mathbb{F}L$) was found to significantly predict rated performance ($r=.29$, $p<.05$). This reflects the fact that, in this highly competitive industry, managers need to be attentive to staff member's unexpressed goals, motives and drives in order to be able to manage their staff effectively. Three 15FQ+ primary factors were found to significantly ($p<.05$) predict potential. These were Intellectance ($\mathbb{B}$, $r=.36$), Enthusiastic ($\mathbb{F}F$, $r=.26$) and Restrained ($\mathbb{F}N$, $r=-.32$). The significant positive correlation between potential and the 15FQ+ Factor $\mathbb{F}F$ (Enthusiastic) and the negative correlation with the 15FQ+ Factor $\mathbb{F}N$ (Restrained), indicates that managers in the financial services sector need to be able to communicate in a clear and unambiguous way, as well as having the ability to enthuse their staff. The positive correlation between potential and Intellectance ($\mathbb{B}$) indicates that confidence in one's own intellectual ability is an important characteristic for managers in this competitive sector. This meaningful pattern of statistically significant correlations provides further support for the concurrent criterion validity of the 15FQ+.

PREDICTING THE PERFORMANCE OF SALES MANAGERS AND CONSULTANTS (LIVE STOCK INDUSTRY)

The 15FQ+ was completed by 68 sales managers and sales consultants working in the live stock industry. Their performance

was rated by their line manager on each of the criteria listed in Table 32. Four of the 15FQ+ primaries were found to predict rated performance across a variety of domains. Most notably, the 15FQ+ Factors Enthusiastic ($\mathbb{F}F$) and Confident (-ve $\mathbb{F}O$) were found to predict rated energy levels indicating, as would be expected, that these primaries are predictive of higher levels of drive and energy. This finding is consistent with the definition of these primaries, and therefore provides further evidence of the validity of these 15FQ+ primary factors. Most significantly, those sales staff whose global performance was rated highest, were found to be more Hard-headed (-ve $\mathbb{F}I$) and more Confident (-ve $\mathbb{F}O$) than were those whose global performance was rated less highly. That these primaries should predict performance in this tough sales environment is to be expected and, as such, provides good evidence of the ability of the 15FQ+ primaries to predict performance, further demonstrating the concurrent criterion validity of this test.

PREDICTING THE PERFORMANCE OF CALL CENTRE STAFF

The 15FQ+ was completed by 199 call centre staff, working in three different job roles (Sales and Service Consultants, $n=109$; Support Specialists, $n=57$; Customer Service Consultants, $n=33$) across three sites. Each staff member's performance was rated, by their line manager, on a number of dimensions that had been previously identified as assessing core components of successful job performance. The statistically significant correlations ($p<.05$) that were found between the 15FQ+ primaries and performance are reported for each of these three job roles in Tables 33, 34 and 35 respectively. The substantial correlations

Table 32: Correlations between the 15FQ+ factors and each facet of job performance

	$\mathbb{F}F$ Enthusiastic	$\mathbb{F}I$ Tender-minded	$\mathbb{F}L$ Suspicious	$\mathbb{F}O$ Self doubting
Analytical Ability	.03	-.18	-.12	-.05
Energy	.33	-.27	-.02	-.31
Decision Making	.15	-.28	.04	-.32
Resilience	.05	.21	-.11	-.08
Interpersonal Skills	.08	-.16	.17	-.31
Planning an Organising	.07	-.24	.05	-.38
Persuasiveness	.04	-.29	.16	.01
Technical Expertise	-.17	-.06	-.15	-.07
Creativity	.10	-.34	.37	-.01
Overall Job Performance	.02	-.32	-.02	-.38

reported in these tables, between a number of the 15FQ+ primaries and the various facets of successful call centre performance, clearly demonstrate the predictive power of this test. These data therefore not only provide strong evidence of the concurrent criterion validity of the 15FQ+, but also demonstrate the potential utility of this test as a tool for aiding selection decisions.

INCREMENTAL VALIDITY OF THE 15FQ+ PRIMARIES

From an extensive meta-analysis of the research literature, Schmidt & Hunter (1998) have demonstrated that reasoning tests have consistently been found to be the best predictors of occupational performance. They have also shown that the use of personality tests, alongside measures of reasoning ability,

Table 33: Correlations between the 15FQ+ factors and each facet of job performance for Sales and Service Consultants

Performance Criterion	15FQ+ Factor
Analytical ability	Intellectance (.42), Socially-bold (.22), Conscientious (.19)
Energy	Suspicious (.26), Radical (.20)
Decision making	Intellectance (.31)
Resilience	none
Planning and organising	Radical (-.27), Enthusiastic (.24), Conscientious (.23), Abstract (.22), Restrained (.20)
Technical expertise	Intellectance (.37)
Creativity	Intellectance (.42)

Table 34: Correlations between the 15FQ+ factors and each facet of job performance for Support Specialists

Performance Criterion	15FQ+ factor
Analytical ability	Empathic (.32), Socially bold (.31), Abstract (.29)
Energy	Radical (.30)
Decision making	Abstract (.33)
Resilience	Restrained (.29), Tense driven (-.29), Socially-bold (.28),
Interpersonal skills	Tense driven (.40), Enthusiastic (.32), Dominant (.31), Restrained (.27)
Planning and organising	Radical (-.32), Abstract (.30)
Persuasiveness	Tense driven (-.40), Restrained (.30)
Technical expertise	Empathic (.31), Socially-bold (.31)
Creativity	Tense driven (.38), Dominant (.30)

Table 35: Correlations between the 15FQ+ factors and each facet of job performance for Customer Service Consultants

Performance Criterion	15FQ+ factor
Analytical ability	Intellectance (.50), Tender-minded (.44), Self-disciplined
Energy	Radical (.48), Socially-bold (.43), Dominant (.40), Enthusiastic (.40),
Interpersonal skills	Socially-bold (.44), Emotionally stable (.42), Radical (.38)
Planning and organising	Enthusiastic (.38)
Persuasiveness	Self-disciplined (.46), Intellectance (.44)
Technical expertise	Intellectance (.46)
Creativity	Intellectance (.49)

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Table 36: Step-wise multiple regressions predicting each of the listed competencies from the 15FQ+ primary factors and the subtests of the GRT2 and the TTB

Competency (Independent variable)	Multiple R	Dependent variables (beta)
Technical	.56 ($p < .001$)	β_H Socially-bold (-.59) β_{Q_4} Tense-driven (.39) β_{Q_1} Radical (-.38) β_E Dominant (-.33)
Customer service	.48 ($p = .01$)	β_A Empathic (.32) VR2 Verbal Reasoning (.25)
Coaching/mentoring	.57 ($p = .001$)	β_H Socially Bold (.49) VA Visual Acuity (.44) NR2 Numerical Reasoning (.33) β_E Dominant (-.31) β_{Q_3} Self-disciplined (-.26)
Innovation	.49 ($p = .05$)	β_H Socially Bold (.37) β_E Dominant (-.35) VA Visual Acuity (.31)
Motivating staff	.43 ($p = .023$)	β_E Dominant (-.36)

further improves the prediction of staff performance. (They have termed this the incremental validity of personality tests.) Given that reasoning tests are known to be the best single predictor of job performance, demonstrating the incremental validity of the 15FQ+, when used in combination with a well validated reasoning test, provides an important test of the utility of this instrument for aiding staff selection decisions.

To explore the incremental validity of the 15FQ+ a sample of staff of mixed race (Black, $n=56$; White, $n=46$; Coloured, $n=3$), working for a major South African utility company, completed the 15FQ+ along with the General Reasoning Test (GRT2) and the Technical Test Battery (TTB). The GRT2 and TTB are well validated measures of mental ability, with the former consisting of subtests which assess Verbal (VR2), Numerical (NR2) and Abstract (ART2) reasoning ability and the latter consisting of subtests which assess Mechanical Reasoning (MR), Spatial Reasoning (SR) and Visual Acuity (VA). Staff performance was rated on a number of different competencies (see Table 36) and step-wise multiple regression was used to predict each rated competency from the 15FQ+, GRT2 and TTB. Inspection of Table 36 indicates, as would be

expected, that each of these competencies was well predicted by a combination of personality factors and reasoning tests scores. These results provide strong evidence of the utility of the 15FQ+ as a staff selection tool, demonstrating that the primary factors improve the prediction of staff performance over and above that achieved through the use of reasoning tests alone.

PREDICTING THE PERFORMANCE OF BRANCH MANAGERS

A major UK based electrical goods wholesaler administered the 15FQ to a sample of 39 branch managers, whose performance had been rated by their District Manager. The performance rating was made (without reference to the respondent's 15FQ scores) on a four-point scale defined as follows:

Exceptional: Fully able to plan, co-ordinate and control resources to maximum effect.

Good: Fully able to plan, co-ordinate and control resources to good effect.

Acceptable: Able to plan co-ordinate and control resources to a satisfactory level.

Poor: Unable to plan, co-ordinate and control resources to a satisfactory level.

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A step-wise multiple regression indicated that three 15FQ factors predicted the performance measure ($R=0.54$ $F(3,35)=4.75$ $p<.01$). The results (presented in Table 37) indicated that those managers who were rated as being more effective tended to be more Hard-headed (realistic), more Emotionally Resilient and more Self-sufficient than those who were rated as being less effective. These three 15FQ factors (fI , fC and fQ_2) were able to account for approximately 25% of the variance in rated performance, clearly demonstrating the concurrent criterion validity of the 15FQ. Given the high level of convergence that has previously been demonstrated between the 15FQ and the second edition of this test, it is reasonable to generalise these validities to the 15FQ+.

Table 37: Multiple Regression results for the prediction of the performance of branch managers (electrical retail)

15FQ+ Factor	Beta weight	p-level
fI Tender-minded	-.39	$p < .01$
fC Emotionally stable	.32	$p < .05$
fQ_2 self-sufficient	.33	$p < .05$

PREDICTING THE PERFORMANCE OF TRAINEE SOLICITORS

A sample of 30 trainee solicitors completed the 15FQ prior to beginning their training contract. Their performance was assessed by their line manager at the end of the first year of their training period. The performance of each trainee solicitor was rated on a five point scale (5 = excellent, 1 = poor). Seven 15FQ factors were found to be correlated with performance. These correlations are presented in Table 38. The 15FQ factors Self-assurance (-ve fO), Emotionally Stable (fC) and Composure (-ve fQ_4) were found to be strongly associated with rated success as a trainee solicitor, indicating that the ability to cope well with pressure is critical for success in this challenging professional role. The factors Socially-bold (fH) and Dominant (fE) were also found to be significantly correlated with success, indicating the need for trainee solicitors to be confident and appropriately assertive in work situations. Finally, and not at all surprisingly, Conscientiousness (fG) was also found to be associated with better performance, with this factor assessing attention to detail and planfulness. These

Table 38: Correlations between the listed 15FQ scales and performance for trainee solicitors (n=30)

15FQ Factor	Correlation
fC	.41
fE	.32
fG	.38
fH	.40
fO	-.51
fQ_4	-.35

data therefore provide strong evidence of the (predictive) criterion validity of the 15FQ. Given the high level of convergence that has previously been demonstrated between the 15FQ and the second edition of this test, it is reasonable to generalise these validities to the 15FQ+.

PREDICTING THE PERFORMANCE SALES STAFF (FINANCIAL SERVICES)

The sales performance of staff (n=98) at a major UK financial services company was rated by their area manager (on the basis of their sales figures) on a five-point scale, defined as: excellent; good; average; acceptable or poor. The performance rating was made without reference to the respondent's 15FQ scores.

A step-wise multiple regression indicated that four of the 15FQ factors predicted sales performance ($R=.48$). As would be predicted, those sales managers who were rated as being more effective were more Self-assured (-ve fO) and more Emotionally stable (fC) than were those who were rated as being less effective. This clearly indicates the importance of the ability to cope effectively with stress for staff working in the high pressured financial services sector. Moreover, those sales managers who were rated as being more effective were also found to be more Socially-bold (fH) than were those who were rated as being less

Table 39: Multiple Regression results for the prediction of the sales performance of staff working in the financial services sector

15FQ Factor	Beta weight	p-level
fO Self-assured	-.41	$p < .01$
fC Emotionally stable	.33	$p < .05$
fH Socially bold	.31	$p < .05$
fG Conscientious	.31	$p < .05$

effective, as we would expect from sales staff. Finally, the 15FQ factor Conscientious (f^cG) was found to be significantly correlated with performance in this industrial sector, with the more conscientious financial sales managers being rated as having superior performance to their less conscientious colleagues. These four personality factors were able to account for just over 20% of the variance in rated sales performance, clearly demonstrating the concurrent criterion validity of the 15FQ. As noted earlier, given the high level of convergence that has previously been demonstrated between the 15FQ and the second edition of this test, it is reasonable to generalise this concurrent criterion data to the 15FQ+.

CONTAMINATION OF THE PRIMARY PERSONALITY FACTORS WITH SOCIAL DESIRABILITY

In order to explore whether the primary personality factors that are assessed by the 15FQ+ are contaminated by social desirability, correlations were calculated between the Social Desirability scale and the 16 primary factors. These correlations are reported in Table 40. Inspection of this table indicates that most of these correlations are small, demonstrating little contamination of the primary personality factors with social desirability. Moreover, as would be expected, the largest correlations are with the anxiety dimensions. As noted earlier this result should be born in mind when interpreting test profiles.

Table 40: Correlations between the 15FQ+ factors and SD

15FQ+	Correlation with SD
f^cA	.18
β	.06
f^cC	.31
f^cE	.13
f^cF	.09
f^cG	.14
f^cH	.21
f^cI	-.11
f^cL	-.26
f^cM	.01
f^cN	.20
f^cO	-.39
f^cQ_1	.17
f^cQ_2	-.05
f^cQ_3	-.20
f^cQ_4	-.34

BIAS OF THE 15FQ+ PRIMARY FACTORS

HOMOGENEITY OF THE 15FQ+ PRIMARIES BY SEX

In order to examine the possibility of gender bias in the 15FQ+ primary factors, the internal consistency of these scales was examined separately for men and women. Tables 41 and 42 present alpha coefficients for the 15FQ+ primaries (for both the standard (Form A) and short forms (Form C) of this test), and for the derived (criterion keyed) scales respectively, broken down by sex. Inspection of these tables reveals that the alpha coefficients for each of the primary factors are broadly equivalent for both men and women. This demonstrates that these

primaries do not show any major sex bias with regard to their respective item homogeneities.

HOMOGENEITY OF THE 15FQ+ PRIMARIES ON A MIXED UK ETHNIC SAMPLE

In order to examine the possibility of ethnic bias in the 15FQ+ primary factors, the internal consistency of these scales was examined separately on a mixed ethnic group sample. Table 43 presents alpha coefficients for the 15FQ+ primaries, on a sample of respondents (n=64) drawn from a variety of ethnic backgrounds. Inspection of this table reveals that the alpha coefficients for each scale are broadly equivalent to those reported above, for predominantly White European samples. This demonstrates that these scales do not show any major ethnic bias with regard to their respective item homogeneities.

Table 41: Reliability Coefficients (alpha) for Men and Women for the 15FQ+ Scales

Factor	Form A		Form C	
	men	women	men	women
fA	.76	.70	.71	.68
fB	.79	.81	.71	.72
fC	.77	.75	.66	.61
fE	.79	.79	.65	.67
fF	.78	.75	.65	.61
fG	.83	.80	.64	.69
fH	.80	.82	.67	.64
fI	.72	.69	.65	.62
fL	.75	.78	.66	.66
fM	.81	.77	.67	.71
fN	.82	.81	.72	.69
fO	.83	.81	.70	.66
fQ ₁	.75	.75	.70	.67
fQ ₂	.80	.76	.69	.69
fQ ₃	.79	.75	.62	.62
fQ ₄	.84	.79	.72	.67
	professional sample n=163	professional sample n=161	professional sample n=163	professional sample n=161

Table 42: Alpha Coefficients for Men and Women on the Derived Scales

Scale	Form A		Form C	
	men	women	men	women
Fake Good	.76	.69	.67	.65
Fake Bad	.75	.68	-	-
eIQ	.71	.65	-	-

MEAN DIFFERENCES IN PERSONALITY AND ITEM BIAS BY SEX

Table 44 presents mean scores on the 15FQ+ primary factors for a sample of men (n=416) and women (n=434). The significance of the mean differences between the scores that the men and the women obtained on the 15FQ+ primaries, was examined using the t-statistic (pooled variances), with the associated significance levels being corrected using the

Table 43: Alpha Coefficients for an ethnic minority sample (n=64)

Scale	
fA	.76
fB	.68
fC	.71
fE	.73
fF	.70
fG	.83
fH	.79
fI	.71
fL	.74
fM	.71
fN	.79
fO	.74
fQ ₁	.71
fQ ₂	.66
fQ ₃	.78
fQ ₄	.79

Bonferroni adjustment. Inspection of Table 44 indicates that a number of these mean scores are significantly different for men and women. As has often been noted, women obtained significantly higher scores than men on the 15FQ+ Factors $\mathbb{A}$ (Empathic), $\mathbb{I}$ (Tender-minded) and $\mathbb{O}$ (Self-doubting). Men, on the other hand, obtained significantly higher scores than women on the 15FQ+ Factors $\mathbb{B}$ (Intellectance), $\mathbb{C}$ (Emotionally Stable), $\mathbb{E}$ (Dominant) and $\mathbb{M}$ (Abstract).

As Wilson (2005) has noted, if the mean differences in test scores across groups is due to real group differences, rather than being due to test bias, it would be expected that the order of the item thresholds will be invariant across the groups even though the absolute level of the items' endorsements will vary between groups. To examine this issue the rank order of the items' means for each primary were compared across men and women by calculating the rank order correlation (Spearman's Rho) of the items' mean scores. These correlations are reported in column four of Table 44.

Inspection of this column indicates that all these average rank order correlations are extremely high. While there is no generally

agreed cut-off that indicates the presence of item bias, all the correlations are sufficiently high as to suggest that the rank order of these items' thresholds do not vary substantially across sex. This suggests that item bias is unlikely to be accounting for the mean scale score differences between men and women reported above.

INVARIANCE OF THE LATENT TRAITS BY SEX

To examine sex bias in the measurement model the factor structure of the 15FQ+ was compared for men and women on the data reported in Table 44. If the 15FQ+ is measuring the same latent traits for both of these groups, the factor structures obtained for each group should be invariant. To examine this, the 15FQ+ primaries were factor analysed (using principal axis factoring) and five factors were retained. The factor congruence coefficient (Barrett, 1986) was calculated to compare the factor structures obtained for the samples of men and women. The factor congruence coefficient was 0.96, indicating that the latent traits assessed by the 15FQ+ are invariant across sex.

Table 44: Mean scores on the 15FQ+ primaries by sex

	Men	Women	Significance of difference	Rank order correlation of item means
$\mathbb{A}$	8.5	20.6	$p < .001$	.90
$\mathbb{B}$	20.7	19.3	$p < .001$	.92
$\mathbb{C}$	18.7	17.3	$p < .01$	.91
$\mathbb{E}$	15.9	14.1	$p < .001$	.89
$\mathbb{F}$	16.1	16.8	n.s.	.88
$\mathbb{G}$	18.3	19.1	n.s.	.93
$\mathbb{H}$	15.6	14.9	n.s.	.89
$\mathbb{I}$	12.8	17.0	$p < .001$	.86
$\mathbb{L}$	5.3	5.4	n.s.	.93
$\mathbb{M}$	10.6	9.9	$p < .05$	.96
$\mathbb{N}$	18.5	18.8	n.s.	.89
$\mathbb{O}$	10.7	12.5	$p < .01$	.90
$\mathbb{Q}_1$	8.3	7.7	n.s.	.96
$\mathbb{Q}_2$	6.4	6.8	n.s.	.92
$\mathbb{Q}_3$	18.1	17.9	n.s.	.91
$\mathbb{Q}_4$	7.5	7.7	n.s.	.92

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MEAN DIFFERENCES IN PERSONALITY AND ITEM BIAS BY ETHNIC GROUP [UK DATA]

Table 45 presents mean scores on the 15FQ+ primary factors for each of the four listed ethnic groups. Due to small numbers, ethnic groups were pooled to form broader ethnic categories, such that: Pakistani and Bangladeshi respondents were combined with other ethnic groups from the Indian subcontinent to form one combined ethnic group; respondents who identified themselves as being from another Asian (e.g. Malay, Japanese, etc.) ethnic group were combined to form one group; respondents who identified themselves as being of Black African, or Black Other ethnic origin were combined with those who identified themselves as being of being Afro-Caribbean ethnic origin to form a combined ethnic group.

The significance of the mean differences between these ethnic groups, on the 15FQ+ primaries, was examined using the t-statistic (pooled variances), with the associated significance levels being corrected using the Bonferroni adjustment. Inspection of Table 45 indicates that most of the mean differences between the ethnic groups are quite modest in size, with few being statistically significant. The main differences that do exist between different

ethnic groups occur on the 15FQ+ Factors β C (Emotionally Stable), β L (Suspicious), β Q₁ (Radical) and β Q₃ (Self-disciplined).

As previously noted, if the mean differences in test scores across groups is due to real group differences, rather than being due to test bias, it would be expected that the order of the item thresholds will be invariant across the groups even though the absolute level of the items' endorsements will vary between groups. To examine this issue the rank order of the items' means for each primary were compared across each of the four ethnic groups by calculating the average rank order correlation (Spearman's Rho) of the items' means across each of the five possible pairs of ethnic groups. These data are presented in column five of Table 44. Inspection of this column indicates that all these average rank order correlations are extremely high. While there is no generally agreed cut-off that indicates the presence of item bias, all the correlations are sufficiently high as to suggest that the rank order of these items' thresholds do not vary substantially across these ethnic groups. This suggests that item bias is unlikely to be accounting for the mean scale score differences between the ethnic groups reported above.

Table 45: Mean scores on the 15FQ+ primaries by ethnic group

	White European (n=472)	Afro-Caribbean/ Black African/ Black Other (n=77)	Indian/ Pakistani/ Bangladeshi (n=166)	Asian Other (n=79)	Average rank order correlation of item means
β A	19.1	18.9	19.7	19.2	.88
β	*20.3	19.5	19.6	*19.0	.78
β C	*†18.0	17.4	*16.4	†16.7	.89
β E	15.9	15.3	16.3	15.0	.89
β F	*16.3	15.2	15.8	*14.9	.89
β G	18.4	17.9	18.0	19.1	.81
β H	*15.8	14.2	15.9	*14.5	.89
β I	14.4	15.3	15.1	15.5	.94
β L	*†5.6	*7.3	†7.8	*7.4	.93
β M	10.5	10.6	10.4	10.7	.89
β N	*18.4	18.8	18.3	*19.7	.86
β O	11.6	11.1	11.7	11.9	.81
β Q ₁	8.5	†7.8	*†9.9	*7.8	.80
β Q ₂	6.7	7.2	7.0	6.8	.94
β Q ₃	*†17.8	18.5	*19.3	†19.8	.84
β Q ₄	8.1	7.6	8.0	7.9	.88

*†† Means which share a common superscript are significantly different from each other at the 5% level or less (corrected using the Bonferroni adjustment)

INVARIANCE OF THE LATENT TRAITS BETWEEN ETHNIC GROUPS

To examine bias in the measurement model, the factor structure of the 15FQ+ was compared for each of the ethnic groups listed in Table 45. If the 15FQ+ is measuring the same latent traits in each of these groups, the factor structures obtained for each group should be invariant. To examine this, the 15FQ+ primaries were factor analysed (using principal axis factoring) and five factors were retained. The factor congruence coefficient (Barrett, 1986) was calculated to compare the factor structure obtained for each ethnic group with that obtained for the other ethnic groups. These coefficients varied from 0.92 to 0.97, indicating that the latent traits assessed by the 15FQ+ are invariant across ethnic group.

MEAN DIFFERENCES IN PERSONALITY BY ETHNIC GROUP (NEW ZEALAND & SOUTH PACIFIC DATA)

Table 46 presents the mean scores on each of the 15FQ+ primary factors for each of three ethnic groups in New Zealand; White Europeans, Maori and Pacific Islanders.

Table 46: Mean scores on the 15FQ+ primaries for respondents of New Zealanders of White European, Maori and Pacific Island ethnic origin

15Q+ Factor	White European (n=545)	Maori (n=102)	Pacific Islander (n=78)
f^A	18.52	18.59	18.29
β	^{††} 19.22	[†] 17.29	[†] 15.68
f^C	[†] 17.37	16.30	[†] 15.22
f^E	14.59	14.44	13.69
f^F	[†] 15.79	[†] 14.24	14.45
f^G	17.65	17.85	17.58
f^H	13.24	12.58	12.78
f^I	14.26	14.79	13.49
f^L	^{††} 5.33	^{††} 7.67	^{††} 9.85
f^M	9.65	10.19	10.45
f^N	18.11	17.90	18.44
f^O	12.37	13.42	13.09
f^Q_1	7.29	7.01	7.51
f^Q_2	7.60	8.68	7.71
f^Q_3	[†] 18.01	18.88	[†] 19.81
f^Q_4	8.88	10.20	9.00

^{††} Means which share the same superscript character are significantly different from each other $p < .0156$

(These data were first reported by Packman, et al., 2005.) The significance of the mean differences between each group was examined by expressing these differences as effect sizes (using pooled variances) and calculating the confidence intervals for each effect size. (Packman et. al. (2005), reported ethnic differences on the global as well as the primary 15FQ+ factors. As a result they adjusted the significance of the confidence intervals for testing the differences between the ethnic groups on the 15FQ+ primaries so that the alpha level for testing these differences was identical across the primary and second order factors. This adjusted significance level is reported in Table 43.) Inspection of this table indicates that with the exception of the 15FQ+ Factors Intellectance (β) and Suspicious (f^L) there are few significant differences in mean scores across these ethnic groups.

THE HOMOGENEITY OF THE 15FQ+ PRIMARY FACTORS FOR BLACK SOUTH AFRICANS

Table 47 presents the alpha coefficients for each of the 16 primary factors measured by the 15FQ+, on a sample of Black South Africans broken down by their score on the VCR2 (a test of verbal reasoning ability). Inspection of this table indicates that for groups of average or above average verbal reasoning ability, the 15FQ+ primaries have good levels of internal consistency. This suggests that what bias there is in the 15FQ+ primary factors for Black South Africans reflects differences in verbal ability rather than reflecting racial differences.

A related finding has been reported by van der Walt et al. (2002) in a meta-analysis of the validities of Five Factor Model personality tests in predicting job performance in Black South African groups. These authors concluded from their meta-analysis that educational level moderated these tests' validities, with Emotional Stability and Conscientiousness only being good predictors of job performance for Black South African respondents who had achieved Grade 12 education or above.

Table 47: Alpha coefficients for each of the 15FQ+ primaries on a sample of Black South Africans, broken down by verbal reasoning ability

15Q+ Factor	VCR2 Stanine 1-2	VCR2 Stanine 3-4	VCR2 Stanine 5	VCR2 Stanine 6-7	VCR2 Stanine 8-9
fA	.49	.61	.69	.70	.71
fB	.69	.72	.71	.73	.70
fC	.73	.72	.74	.72	.71
fE	.48	.59	.64	.71	.73
fF	.73	.74	.77	.76	.76
fG	.54	.66	.77	.76	.78
fH	.74	.78	.79	.82	.83
fI	.62	.79	.71	.75	.72
fL	.62	.67	.71	.73	.74
fM	.35	.44	.56	.65	.64
fN	.53	.69	.73	.76	.75
fO	.49	.66	.75	.72	.79
fQ ₁	.35	.53	.63	.72	.76
fQ ₂	.62	.68	.72	.77	.72
fQ ₃	.51	.43	.57	.65	.66
fQ ₄	.55	.72	.76	.78	.82

APPENDIX I – ADMINISTRATION OF THE 15FQ+

BEFORE STARTING THE QUESTIONNAIRE

Put candidates at their ease by giving information about yourself, the purpose of the questionnaire, the timetable for the day, if this is part of a wider assessment programme, and how the results will be used and who will have access to them. Ensure that you and other administrators have switched off mobile phones etc.

The instructions below should be read out verbatim and the same script should be followed each time the 15FQ+ is administered to one or more candidates. Instructions for the administrator are printed in ordinary type. Instructions designed to be read aloud to candidates are in bold text and in speech marks.

Say:

“From now on, please do not talk amongst yourselves, but ask me if anything is not clear. Please ensure that any mobile telephones, pagers or other potential distractions are switched off completely. We shall be doing the Fifteen Factor Questionnaire Plus which has no time limit, however you should aim to complete all questions in 30 minutes. During the test I shall be checking to make sure you are not making any accidental mistakes when filling in the answer sheet. I will not be checking your responses.

I will shortly hand out the question booklet and answer sheet for the questionnaire, but before I do I would like to make a couple of general points.

- For the 15FQ+ there is a question booklet and a separate answer sheet. Please do not mark the question booklet in any way, as we like to use them more than once.
- When completing the answer sheet, it is important to give a clear indication of your answer. If you want to change an answer, do not rub out your original, but cross it out clearly and mark your alternative. Ensure that there is no doubt about which is your preferred answer.

Are there any questions about what I have said so far?”

Check for understanding of the instructions so far, then say:

“Good. I will now give out the question booklets and answer sheets.”

WARNING: It is most important that answer sheets do not go astray. They should be counted out at the beginning of the test and counted in again at the end.

DISTRIBUTE THE ANSWER SHEETS AND QUESTION BOOKLETS

Then say:

“Put your name and the date in the space provided on the answer sheet. Then please open the question booklet and we will go through the instructions together.

Take plenty of time to make sure that you understand what is expected of you. When we have been through the instructions, please ask any questions that you may have. Then, wait to be given the instruction to start.”

Read aloud the instructions on Page 1 of the question booklet.

“This is a questionnaire concerning your interests, preferences and opinions.

- There is no time limit, however, most people take about 30 minutes to complete the questionnaire.
- Make sure that you have an answer sheet and a pencil before you begin.
- You are asked to choose between three possible answers to each question – A, B or C.
- When you have selected your answer, record this by blackening in the corresponding box on your answer sheet.
- Study the example in the booklet. If your choice of answer is A ‘true’, then you would blacken box A against question one on your answer sheet.

Are there any questions?”

Deal with any questions appropriately, then say:

“Before you start completing the questionnaire, please make sure that you have recorded your name and any other details requested on the answer sheet. When answering the questions remember the following:

- **Make sure you answer EVERY question, even those which do not seem to apply directly to you.**
- **Do not spend too much time considering your answer to each question. The information given in a question may not be as full as you would wish, but answer the best you can.**
- **Try to avoid the middle answer wherever possible.**
- **Be as honest and truthful as you can. Don’t give an answer just because it seems to be the right thing to say.**
- **If you wish to change an answer, please mark it clearly with a cross and insert your new answer.**

Are there any questions?”

Make sure that everyone is comfortable with the instructions and knows what they are required to do. When everyone is ready, say:

“Please turn over and start. Once you have finished, please put your pencil down and wait quietly until everyone else has finished.”

Answer only questions relating to procedure at this stage, but enter in the Administrator’s Test Record any other problems which occur. Walk around the room at appropriate intervals to check for potential problems.

Once all the candidates have indicated that they have completed the questionnaire, collect all the test materials. The answer sheets should be kept until they are scored and the other test materials should now be stored away securely until they are required again.

Make sure that you collect all information, materials and equipment before finally thanking the candidates and allowing them to go. Record any event, which might have disturbed the candidates for future reference.

Say:

“Thank you for completing the Fifteen Factor Plus Questionnaire.”

APPENDIX II – SCORING OF THE 15FQ+

1. CHECKING

The first step in scoring the 15FQ+ is to ensure that the respondent's details have been entered clearly into the appropriate boxes on the answer sheet, and that all 200 items have been answered. This should ideally be done before the respondents have left the test session. Look out specifically for questions that may have been omitted or any answers that have been changed, as all the boxes need to be clearly marked. If necessary, refer back to the respondent to answer any outstanding questions.

The answer sheet is a single A3 sheet folded and sealed. Open the sheet by inserting a pencil or pen in the top right hand corner. Slide the pen across the top, down the right hand edge and along the bottom, but not along the left-hand edge. Gently separate the two halves and open the sheet out flat to expose the scoring key on the left and profile chart on the right.

2. SCORING

Starting at the top of the score key, count up all the item scores for Factor $\mathbb{F}A$, allowing one or two points as indicated, and enter the total raw score in the box for Factor $\mathbb{F}A$. Continue with all the remaining factors - $\mathbb{B}$ through to $\mathbb{F}Q_4$. The minimum raw score is 0 and the maximum 24 for each of these factors. The scoring for the Social Desirability scale is the same as $\mathbb{F}A$ - $\mathbb{F}Q_4$ although the maximum score for SD is 16.

3. PROFILING THE PRIMARIES

The 15FQ+ raw scores are converted into sten scores using the integral norm table contained within the Profile Chart. For Factor $\mathbb{F}A$, locate the raw score on the first line of the profile chart and blacken in the dot. This process is repeated for each factor in turn including Fake Good, which has a separate section.

4. CALCULATING GLOBAL FACTORS

Each of the five global factor scores is calculated using the equations provided. First transfer the sten scores from the Primary Factors into the appropriate boxes. Then, using a calculator, multiply each sten by its weight and enter the result in the subtotal space below.

Calculate the 'Global Sten' by adding and subtracting these weighted scores.

Although the final global should be within the range of 1 to 10, it is possible, although rare, to obtain values just outside this range. If this is the case, just round to the nearest legitimate sten value, 1 or 10.

Transfer the 'Global Sten' score onto the profile chart.

A worked example for Global II is provided on the next page.

A respondent has scored a sten of 6 on Factor fC , 3 on Factor fL , 2 on Factor fO and 7 on Factor fQ_4 .

Figure 1: Global factor equation for Global Factor N

$$-.35 \times \boxed{fC} + .15 \times \boxed{fL} + .31 \times \boxed{fO} + .41 \times \boxed{fQ4} + 2.64 = \boxed{}$$

1. Transcribe the sten scores for fC (6), fL (3), fO (2) and fQ_4 (7) into their respective boxes.
2. Multiply .35 by 6 and enter the product into M- (memory minus) as the weight is negative.
3. Multiply .15 by 3 and enter the product into M+ (memory plus).
4. Multiply .31 by 2 and enter the product into M+ (memory plus).
5. Multiply .41 by 7 and enter the product into M+ (memory plus)
6. Enter 2.64 into M+
7. Press MR and write the total in the N box.

The calculator keys that were pressed are as follows:

$\boxed{.}$ $\boxed{3}$ $\boxed{5}$ $\boxed{\times}$ $\boxed{6}$ $\boxed{=}$ $\boxed{M-}$
 $\boxed{.}$ $\boxed{1}$ $\boxed{5}$ $\boxed{\times}$ $\boxed{3}$ $\boxed{=}$ $\boxed{M+}$
 $\boxed{.}$ $\boxed{3}$ $\boxed{1}$ $\boxed{\times}$ $\boxed{2}$ $\boxed{=}$ $\boxed{M+}$
 $\boxed{.}$ $\boxed{4}$ $\boxed{1}$ $\boxed{\times}$ $\boxed{7}$ $\boxed{=}$ $\boxed{M+}$
 $\boxed{2}$ $\boxed{.}$ $\boxed{6}$ $\boxed{4}$ $\boxed{M+}$ $\boxed{MR}$

Figure 2: Completed global factor equation for Global Factor II

$$-.35 \times \boxed{6} + .15 \times \boxed{3} + .31 \times \boxed{2} + .41 \times \boxed{f7} + 2.64 = \boxed{4.48}$$

The global factor score can be rounded to the nearest whole number, where .5 is rounded up. In the example, we would round .48 down and use a sten value of 4.

5. PROFILING THE GLOBAL FACTORS

In the global factor section of the profile chart, blacken the dot corresponding to the sten values for each of the global factors, I to V.

6. FINAL STEP

As a convention, the dots for each of the primaries and global factors are joined by straight interconnecting lines.

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