# Psychometrics

# Work Personality Index and the Emotional Quotient Inventory

**wpi**

*jopie van rooyen*

**Compiled by:**
Casper van Zyl and Nicola Taylor, Jopie van Rooyen & Partners SA (Pty) Ltd.

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

# Contents

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## List of Tables

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## Introduction

Personality assessment in South Africa is an established practice which is employed in a variety of different settings. For example, is it frequently utilised for the purpose of personnel selection, thereby highlighting the importance of personality measurement in the world of work. At the same time Emotional Intelligence has also been identified as a crucial dimension of effective functioning in the workplace and other contexts.  The WPI was developed in North America and standardised on a North American sample. The purpose of the present study is to investigate the psychometric properties of the Work Personality Index (WPI) in a South African context, along with the Emotional Quotient Inventory (EQi). The results will be used as evidence of construct validity for the WPI in a South African context.

## Description of the assessments

### Work Personality Index

The Work Personality Index (Bakker & Macnab, 2001) is an inventory designed to identify personality traits that directly relate to work performance. The WPI is not based on a theoretical model of human personality but rather seeks to identify those traits that research has shown to be related to successful job performance.  The WPI consist of 17 primary scales that measure five global constructs. The five constructs are labelled Achievement Orientation, Conscientiousness, Social Orientation, Practical Intelligence and Adjustment. These constructs do, however, closely resemble the traits identified by the Five Factor Model of Personality. Each of these constructs is subdivided into two to five of the primary scales which allows for a finer level of assessment of the five constructs. The primary scales that make up each of the constructs are:

- Achievement Orientation (Ambition, Initiative, Flexibility, Energy, Leadership);
- Conscientiousness (Persistence, Attention to detail, Rule Following, Dependability);
- Social Orientation (Teamwork, Concern for Others, Outgoing, Democratic);
- Practical Intelligence (Innovation, Analytical Thinking); and
- Adjustment (Self-Control, Stress Tolerance).

The WPI was developed for use primarily in the personnel selection, career development and team building contexts. The WPI has been shown to be a reliable measure of work personality, thereby helping professionals to effectively match people and their work roles.

**◲ Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## Emotional Quotient Inventory

The Emotional Quotient Inventory (EQi; Bar-On, 2002) is an inventory designed to measure Emotional Intelligence by means of 133 items on a five-point response scale. The assessment aims to measure an array of non-cognitive abilities relating to an individual's coping ability and general psychological well-being. The EQi comprises of five composite scales, fifteen subscales, four validity scales, and also renders a total EQ score. The five composite scales are: Intrapersonal, Interpersonal, Adaptability, Stress Management and General Mood. Each of these composite scales are divided into two to five subscales which are listed below:

- **Intrapersonal** (Self-regard, Emotional Self-Awareness, Assertiveness, Independence, Self-Actualisation);
- **Interpersonal** (Empathy, Social Responsibility);
- **Adaptability** (Reality Testing, Flexibility, Problem Solving);
- **Stress Management** (Stress Tolerance, Impulse Control); and
- **General Mood** (Optimism, Happiness).

The assessment can be used in a variety of ways and settings, but is most commonly employed in corporate, educational, clinical, medical and research settings. The EQi measures a clearly defined construct that provides valuable information about an individual's ability to effectively manage environmental demands and pressures.

**Psychometrics**
BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

# Work Personality Index

## Sample Description

The WPI sample consisted of 1 886 South African working adults that completed the assessment between 2005 and 2010 for selection and development purposes. The South African data were extracted by the publishers from their database, compiled and sent to the author. From this sample, 284 cases were removed due the possibility that they may be duplicate cases, leaving a total sample size of 1 602. *Table 1* shows the demographic composition of the sample in terms of age and gender representation. Age was not reported on the WPI, however 38.4% of this information could be retrieved from the related EQi data.

**Table 1:** Demographic description of WPI sample

| Gender | n | % |
|--------|------|-----|
| Women | 639 | 39.9 |
| Men | 962 | 60 |
| Total | 1602 | 100 |
| **Age** | **n** | **%** |
| 18-25 | 115 | 18.7 |
| 26-35 | 271 | 44.1 |
| 36-45 | 153 | 24.9 |
| 46-70 | 76 | 12.4 |
| **Total** | **615** | **38.4** |

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

*Table 2* contains the descriptive statistics for each of the primary scales of the WPI. The mean scores were relatively high, but not unexpected since the sample is based on candidates who completed the assessment for selection purposes. This can be compared to the sten scores of the North American sample. Sten scores have a mean of 5.5 and a standard deviation of 2. Scores for the S.A. sample were higher on each of the scales of the WPI.

**Table 2:** Descriptive statistics for the WPI sample

| Scale | Mean | SD |
|---|---|---|
| Ambition | 6.74 | 1.70 |
| Initiative | 6.61 | 1.66 |
| Flexibility | 5.68 | 1.74 |
| Energy | 7.11 | 1.60 |
| Leadership | 5.96 | 1.64 |
| Persistence | 7.34 | 1.53 |
| Attention to detail | 7.04 | 1.47 |
| Rule-following | 7.59 | 1.79 |
| Dependability | 6.82 | 1.68 |
| Teamwork | 6.90 | 1.60 |
| Concern for others | 6.03 | 1.63 |
| Outgoing | 6.61 | 1.53 |
| Democratic | 5.79 | 1.78 |
| Innovation | 5.90 | 1.53 |
| Analytical thinking | 5.85 | 1.64 |
| Self-control | 7.17 | 1.89 |
| Stress Tolerance | 7.59 | 1.62 |

**Psychometrics**
BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

# Reliability analysis

The internal consistency reliability of a test reflects the degree to which a specified set of items are sampling the same domain. The internal consistency reliability for each of the primary scales of the WPI was calculated using Cronbach's alpha (a) coefficient (Cronbach, 1951). The closer the internal consistency reliability is to 1, the more reliable the test. *Table 3* shows the Cronbach alpha coefficients for the South African sample. All of the scales except for the Democratic scale had acceptable reliabilities of 0.70 and higher.

**Table 3:** Internal consistency reliability

| Primary Scale | $a$ |
|---|---|
| Achievement Orientation | .90 |
| Ambition | .70 |
| Initiative | .72 |
| Flexibility | .74 |
| Energy | .79 |
| Leadership | .81 |
| Conscientiousness | .91 |
| Persistence | .78 |
| Attention to detail | .74 |
| Rule-Following | .83 |
| Dependability | .77 |
| Social Orientation | .84 |
| Teamwork | .73 |
| Concern for Others | .78 |
| Outgoing | .70 |
| Democratic | .55 |
| Practical Intelligence | .83 |
| Innovation | .80 |
| Analytical Thinking | .70 |
| Adjustment | .87 |
| Self Control | .79 |

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

# Factor analysis

Exploratory factor analysis is a useful tool with which to evaluate the construct validity of a test. Factor analysis was used to investigate the construct validity of the WPI at a scale level. The 17 primary scales of the WPI were subjected to a principal components analysis. The theoretical model specifies five global constructs, and in order to try and replicate the factor structure reported in the manual, five components were specified for extraction. Five components were successfully extracted and rotated to a simple structure by means of the Varimax criterion. The five components that emerged closely matched the theoretical structure of the WPI and the extracted component structure is similar to the structure reported in the manual. Table 4 displays the rotated component matrix. Primary loadings are marked in bold and underlined whereas secondary and tertiary loadings are in bold only.

All of the primary scales (hereafter 'scales') that make up the global constructs had meaningful loadings on their identified components. Thirteen of the scales had primary loadings on their identified components as expected. Four of the scales only had secondary loadings on their identified components. The five component solution accounted for 69.32% of the variance on the component matrix.

## Component 1

All five of the Achievement Orientation scales had salient loadings on this component, making it identifiable as such.  Another seven scales also had loadings of >0.35 on this component. These include: Persistence, Attention to detail, Dependability, Innovation and Stress tolerance which could likely prove to be important aspects of any Achievement Orientation construct. Concern for Others also had a salient loading of 0.35 and is further discussed in Component 2. A negative loading of -0.32 was found for the Democratic scale on this component. Considering the additional scales that also load on this component, positively and negatively, it becomes possible to speculate that this component may be indicative of a well adjusted worker or perhaps an expanded concept of important leadership qualities.

**Table 4:** Rotated Component Matrix of the WPI primary scales

| Scale | Component | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| Ambition | **.745** | .004 | .103 | .072 | .227 |
| Initiative | **.720** | .134 | .210 | -.073 | .328 |
| Flexibility | **.406** | .013 | .264 | **-.619** | .234 |
| Energy | **.755** | .179 | .282 | .110 | .122 |
| Leadership | **.633** | .064 | -.291 | -.071 | **.375** |
| Persistence | **.707** | .069 | .313 | **.361** | .151 |
| Attention to Detail | **.359** | .042 | .228 | **.664** | .296 |
| Rule-Following | .182 | .138 | .212 | **.770** | .034 |
| Dependability | **.665** | -.024 | .285 | **.398** | .072 |
| Teamwork | .283 | **.754** | .237 | .082 | .200 |
| Concern for Others | **.346** | .319 | **.493** | .102 | -.009 |
| Outgoing | .255 | **.799** | .158 | -.021 | .094 |
| Democratic | -.319 | **.729** | .020 | .113 | -.091 |
| Innovation | **.422** | .188 | .112 | -.068 | **.657** |
| Analytical Thinking | .205 | -.004 | .167 | .151 | **.849** |
| Self-Control | .075 | .177 | **.856** | .180 | .156 |
| Stress Tolerance | **.492** | .150 | **.589** | .027 | .267 |

*Note: Component loadings greater than 0.34 are indicated in **boldface.**

## Component 2

This component was identified as Social Orientation since all of the scales for this global construct had salient loadings on this component. Interestingly, Concern for Others had a primary loading on component 3, a secondary loading on component 1 and only a tertiary loading on its expected component. When evaluating the items of the other Social Orientation scales of Teamwork, Outgoing and Democratic, it seems plausible that the weaker loading of Concern for Others may be the result of more intrapersonal types of questions as opposed to more interpersonal questions in the other scales.

## Component 3

This component was identified as Adjustment with primary scale loadings >0.58 on Self-Control and Stress Tolerance. Stress Tolerance also had a secondary loading on component 1 of 0.49. Concern for Others had its primary loading on this component as mentioned above. When considering Self-Control at an item level it becomes clear that this scale largely measures controlled behaviour when interacting with others, suggesting an absence of hostile or cold behaviours. This might explain the strong loading of Concern for Others on this component since these constructs are more conceptually similar than different at item level. Persistence also had a tertiary loading on this component of 0.31. It is conceivable however that individuals characterised by high levels of Self-Control would also be persistent at their tasks.

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## Component 4

All the scales for Conscientiousness had salient loadings on component 4. Two of the four scales comprising this construct had primary loadings on component 1. These scales are Persistence and Dependability with loadings of 0.71 and 0.67 respectively. Component 1 was identified as Achievement Orientation, and on the WPI this construct stands alone, whereas on other personality inventories Achievement Orientation is often included as a subscale of Conscientiousness. The double loadings therefore make sense, since one would expect some level of overlap between the two constructs.

## Component 5

The Innovation and Analytical Thinking scales had primary loadings on component 5 as postulated by the theoretical model for Practical Intelligence. The Innovation scale however had a secondary loading of 0.42 on component 1. This provides support for the notion that component 1 may be measuring a larger leadership construct. Both Initiative 0.32 and Leadership 0.37 had secondary loadings on this component. On a theoretical level, Initiative and Leadership might be expected constructs in any consideration of Practical Intelligence.

The theoretical model of the WPI dictates that five components should be extracted. However, when inspecting the scree plot (Cattell, 1966) and considering Kaiser's (1970) criterion of eigenvalues greater than unity, it appears that the extraction of three components might be more appropriate. If the WPI was not developed based on a theoretical model, and it still approximates the Five Factor Model, it seems likely that the three component structure extracted could also be explained by Eysenck's (1992) 3-factor structure of personality. A three component solution accounts for 59.20% of the variance on the component matrix.

**Psychometrics**
BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

# Rasch Measurement

The Rasch model is known as a fundamental measurement model, and is based on the assumption that the probability of achieving higher scores on a test increases as individuals possess more of a latent trait, and decreases as they possess less of the trait, an indication that items become more difficult to endorse (Green & Frantom, 2002). In other words, the probability of endorsing an item on a test is a function of the difficulty of the item and the ability of the person. The Rasch model is a method of logistic probability modelling that estimates item locations independent of the sample characteristics, allowing the researcher to make inferences about the test regardless of the distribution of the sample (Bond & Fox, 2001). The unit of measurement in Rasch analysis is the logit (or log-odds unit), and is the same for item location parameters as it is for person location parameters. The mean logit score is set at 0, with higher scores indicating greater difficulty and greater ability, and negative scores indicating lesser difficulty and lesser ability (Bond & Fox, 2001).

## Rasch Analysis

The person separation reliability, the number of items that misfit (underfit and overfit) as well as the number of items displaying DIF for each of the scales of the WPI are reported in *Table 5*. The person separation reliability is a similar estimate to Cronbach's alpha reliability estimate, and indicates how well individuals' level of ability was estimated. Misfit occurs when items do not behave according to the stringent requirements set by the model.  Items that do not adhere to the model parameters are classified as items that either underfit or overfit the model, depending on the relevant statistical value. Underfit means that the specific item behaves in an unpredictable way and may be measuring something else. Overfit means that the item is too predictable and may be considered superfluous. Differential Item Functioning (DIF) examines the extent to which various groups may be responding significantly different to items on the scale.  DIF was investigated for men and women on items of the WPI.

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

**Table 5:** Rasch summary table

| Scale | Person reliability | Number of Underfit items | Number of Overfit items | Number of DIF items |
|---|---|---|---|---|
| Achievement Orientation | 0.88 | 3 | 2 | 1 |
| Ambition | 0.64 | 1 | 0 | 0 |
| Initiative | 0.62 | 0 | 0 | 0 |
| Flexibility | 0.72 | 0 | 0 | 0 |
| Energy | 0.70 | 1 | 0 | 2 |
| Leadership | 0.78 | 1 | 1 | 0 |
| Conscientiousness | 0.89 | 2 | 2 | 0 |
| Persistence | 0.66 | 0 | 1 | 0 |
| Attention to detail | 0.67 | 1 | 1 | 0 |
| Rule Following | 0.79 | 0 | 0 | 0 |
| Dependability | 0.68 | 0 | 1 | 0 |
| Social Orientation | 0.81 | 4 | 3 | 0 |
| Teamwork | 0.69 | 0 | 0 | 0 |
| Concern for Others | 0.71 | 1 | 1 | 0 |
| Outgoing | 0.65 | 1 | 2 | 0 |
| Democratic | 0.51 | 0 | 1 | 0 |
| Practical Intelligence | 0.79 | 2 | 2 | 0 |
| Innovation | 0.73 | 1 | 1 | 0 |
| Analytical Thinking | 0.65 | 1 | 0 | 0 |
| Adjustment | 0.84 | 2 | 0 | 0 |
| Self-Control | 0.75 | 0 | 0 | 0 |
| Stress Tolerance | 0.76 | 1 | 0 | 0 |

Detailed Rasch-statistics and category probability curves for each of the WPI scales for each of the scales can be examined by contacting the research department of JVR. Category probability curves demonstrate the probability of endorsing a particular Likert response category on each of the scales of the WPI. It was observed that on most of the scales, response category 4 (Agree) was the category most likely to be endorsed, whereas Response category 3 (Neutral) was the most probable category to be endorsed across all levels of ability in only a very few cases.

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## Mean Differences

The means of the 17 scales on the WPI of the South African sample were compared to those of the North American normative sample (Sten score = 5.5). *Table 6* contains the results of a one-sample t-test for mean differences between the SA sample and the U.S. mean of 5.5. Cohen's *d* effect sizes are also reported.

**Table 6:** One sample t-test for an S.A. sample (Sten = 5.5)

| Scale | Mean | SD | t | p | d |
|---|---|---|---|---|---|
| Ambition | 6.74 | 1.70 | 29.27 | 0.00 | 0.62 |
| Initiative | 6.61 | 1.69 | 26.83 | 0.00 | 0.56 |
| Flexibility | 5.68 | 1.74 | 4.07 | 0.00 | 0.09 |
| Energy | 7.11 | 1.59 | 40.36 | 0.00 | 0.80 |
| Leadership | 5.96 | 1.64 | 11.32 | 0.00 | 0.23 |
| Persistence | 7.34 | 1.53 | 48.25 | 0.00 | 0.92 |
| Attention to detail | 7.04 | 1.47 | 42.01 | 0.00 | 0.77 |
| Rule following | 7.59 | 1.79 | 46.73 | 0.00 | 1.05 |
| Dependability | 6.82 | 1.69 | 31.51 | 0.00 | 0.66 |
| Teamwork | 6.90 | 1.60 | 35.04 | 0.00 | 0.70 |
| Concern for Others | 6.03 | 1.63 | 13.10 | 0.00 | 0.27 |
| Outgoing | 6.61 | 1.53 | 29.10 | 0.00 | 0.56 |
| Democratic | 5.79 | 1.78 | 6.44 | 0.00 | 0.14 |
| Innovation | 5.90 | 1.53 | 10.48 | 0.00 | 0.20 |
| Analytical thinking | 5.85 | 1.64 | 8.57 | 0.00 | 0.18 |
| Self-Control | 7.17 | 1.89 | 35.41 | 0.00 | 0.83 |
| Stress-Tolerance | 7.59 | 1.62 | 51.62 | 0.00 | 1.04 |

The S.A. sample scored significantly higher than the North American mean on all of the scales of the WPI. Cohen's *d* effect sizes were calculated to further explore these mean differences. Medium to large effect sizes were found for 11 of the 17 scales (Cohen, 1988). These are highlighted in bold in Table 6. Some of the largest effect sizes were found for Rule Following (1.05) and Stress Tolerance (1.04). This significant score differences and noteworthy effect sizes highlights the need for locally developed norms for applicants in South Africa.

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## Gender

The WPI sample of 1600 respondents was also subjected to tests for mean differences across gender. *Table 7* reports the test statistics for each of the scales on the WPI. The mean differences in the subgroups should not be considered as evidence of test bias. Statistically significant differences between men and women were found for Leadership, Attention to detail, Dependability, Teamwork, Concern for Others, Outgoing, Innovation, Analytical Thinking and Stress Tolerance. However when considering the effect sizes for these differences, they are all found to be quite small (Cohen, 1992). The statistical significance may be due to the large sample size, and it appears that there were no real differences between men and women on the WPI.

**Table 7:** Mean difference test statistics across gender

| Scale | Women | | Men | | $F$ (df = 1600) | $P$ | $n_p^2$ |
|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | | | |
| Ambition | 6.71 | 1.67 | 6.77 | 1.73 | 0.50 | 0.48 | 0.000 |
| Initiative | 6.64 | 1.69 | 6.59 | 1.64 | 0.35 | 0.56 | 0.000 |
| Flexibility | 5.69 | 1.79 | 5.67 | 1.71 | 0.33 | 0.86 | 0.000 |
| Energy | 7.10 | 1.57 | 7.11 | 1.61 | 0.00 | 0.99 | 0.000 |
| Leadership | 5.67 | 1.67 | 6.16 | 1.59 | 33.74 | 0.00 | 0.021 |
| Persistence | 7.41 | 1.47 | 7.30 | 1.57 | 1.89 | 0.17 | 0.001 |
| Attention to detail | 7.16 | 1.43 | 6.96 | 1.49 | 7.31 | 0.01 | 0.005 |
| Rule following | 7.69 | 1.77 | 7.53 | 1.80 | 3.05 | 0.08 | 0.002 |
| Dependability | 7.05 | 1.62 | 6.67 | 1.70 | 20.08 | 0.00 | 0.012 |
| Teamwork | 6.77 | 1.64 | 7.00 | 1.57 | 8.04 | 0.01 | 0.005 |
| Concern for Others | 6.26 | 1.59 | 5.88 | 1.63 | 20.43 | 0.00 | 0.013 |
| Outgoing | 6.49 | 1.57 | 6.69 | 1.50 | 6.78 | 0.01 | 0.004 |
| Democratic | 5.78 | 1.77 | 5.79 | 1.78 | 0.00 | 0.96 | 0.000 |
| Innovation | 5.63 | 1.60 | 6.08 | 1.45 | 34.57 | 0.00 | 0.021 |
| Analytical thinking | 5.62 | 1.66 | 6.00 | 1.60 | 21.45 | 0.00 | 0.013 |
| Self-Control | 7.11 | 1.87 | 7.21 | 1.90 | 1.08 | 0.30 | 0.001 |
| Stress-Tolerance | 7.39 | 1.66 | 7.72 | 1.58 | 16.27 | 0.00 | 0.010 |

# Psychometrics
BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## Age

The WPI sample was also subjected to mean difference tests, with the aim of comparing means across the different age categories used in the sample. The results of these tests are reported in *Table 8* and *Table 9*. Statistically significant differences were found only for the Persistence, Dependability, Teamwork and Democratic scales of the WPI. The effect sizes were also calculated to further examine the magnitude of these differences. The partial eta squared values for each of the differences indicated that membership in a particular age group accounted for less than 1% of the variance in scores. Overall, no real differences were found with regard to age differences and scores on the WPI.

**Table 8:** Descriptive statistics across age categories

| Scale | 18 – 25 | | 26 -35 | | 36 – 45 | | 46 - 70 | |
|---|---|---|---|---|---|---|---|---|
| | M | SD | M | SD | M | SD | M | SD |
| Ambition | 7.10 | 1.57 | 6.77 | 1.64 | 6.74 | 1.79 | 6.45 | 1.69 |
| Initiative | 6.63 | 1.47 | 6.84 | 1.54 | 6.77 | 1.65 | 6.55 | 1.63 |
| Flexibility | 5.71 | 1.67 | 5.95 | 1.71 | 5.57 | 1.71 | 5.54 | 1.65 |
| Energy | 7.18 | 1.38 | 7.28 | 1.50 | 7.50 | 1.62 | 6.93 | 1.83 |
| Leadership | 5.69 | 1.35 | 5.96 | 1.70 | 6.13 | 1.64 | 5.61 | 1.81 |
| Persistence | 7.60 | 1.24 | 7.61 | 1.39 | 7.37 | 1.59 | 7.01 | 1.55 |
| Attention to detail | 7.29 | 1.18 | 7.20 | 1.42 | 7.11 | 1.34 | 6.87 | 1.37 |
| Rule following | 7.74 | 1.58 | 7.91 | 1.70 | 7.83 | 1.56 | 7.93 | 1.60 |
| Dependability | 7.41 | 1.50 | 6.93 | 1.47 | 6.88 | 1.83 | 6.24 | 1.77 |
| Teamwork | 6.84 | 1.44 | 7.07 | 1.41 | 7.34 | 1.48 | 6.99 | 1.31 |
| Concern for Others | 6.32 | 1.48 | 5.98 | 1.51 | 6.17 | 1.74 | 6.00 | 1.71 |
| Outgoing | 6.97 | 1.36 | 6.83 | 1.48 | 6.62 | 1.50 | 6.82 | 1.43 |
| Democratic | 6.37 | 1.53 | 5.93 | 1.69 | 5.42 | 1.94 | 5.76 | 1.56 |
| Innovation | 6.13 | 1.22 | 5.81 | 1.55 | 5.97 | 1.45 | 6.01 | 1.55 |
| Analytical thinking | 6.11 | 1.38 | 5.86 | 1.67 | 5.67 | 1.81 | 5.51 | 1.72 |
| Self-Control | 7.41 | 1.72 | 7.37 | 1.81 | 7.39 | 1.82 | 7.14 | 1.84 |
| Stress-Tolerance | 7.82 | 1.48 | 7.92 | 1.42 | 7.84 | 1.54 | 7.51 | 1.79 |

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

**Table 9:** Mean difference test statistics across age categories

| Scale | $F$ (df = 591) | $p$ | $n_p^2$ |
|---|---|---|---|
| Ambition | 2.37 | 0.07 | 0.012 |
| Initiative | 0.89 | 0.45 | 0.004 |
| Flexibility | 2.12 | 0.10 | 0.011 |
| Energy | 2.43 | 0.07 | 0.012 |
| Leadership | 2.48 | 0.06 | 0.012 |
| Persistence | 3.96 | 0.01 | 0.020 |
| Attention to detail | 1.63 | 0.18 | 0.008 |
| Rule following | 0.35 | 0.79 | 0.002 |
| Dependability | 7.98 | 0.00 | 0.039 |
| Teamwork | 2.79 | 0.04 | 0.014 |
| Concern for Others | 1.43 | 0.23 | 0.007 |
| Outgoing | 1.29 | 0.28 | 0.006 |
| Democratic | 6.71 | 0.00 | 0.033 |
| Innovation | 1.31 | 0.27 | 0.007 |
| Analytical thinking | 2.41 | 0.07 | 0.012 |
| Self-Control | 0.41 | 0.74 | 0.002 |
| Stress-Tolerance | 1.41 | 0.24 | 0.007 |

**Psychometrics**

# WPI and EQ-i

## Sample description

The EQ-i sample is based on a data-extraction from the JVR database comprising of 38285 working adults that completed the assessment from 2005 to 2010 for selection purposes. The data from the EQ-i was matched with the WPI data, rendering a total sample of 615 individuals who completed both the WPI and the EQ-i simultaneously or within a six-month period. *Table 10* shows the demographic description of the combined sample.differences and scores on the WPI.

**Table 10:** Demographic description of the combined sample

| Gender | n | % |
|--------|-----|------|
| Women | 233 | 37.9 |
| Men | 382 | 62.1 |
| Total | 615 | 100 |
| **Age** | **n** | **%** |
| 18-25 | 115 | 18.7 |
| 26-35 | 271 | 44.1 |
| 36-45 | 153 | 24.9 |
| 46-70 | 76 | 12.4 |
| **Total** | **615** | **100** |

**Psychometrics**
BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## Descriptive statistics

The *Table 11* contains descriptive statistics for the South African EQi sample. Mean and standard deviation scores for each of the 15 subscales, 5 composite scales, as well as total EQ are reported. The descriptive statistics for the scales of the WPI are reported in *Table 12*.

**Table 11:** Descriptive statistics for EQi the combined sample

| Scale | Mean | SD |
|---|---|---|
| Total EQ | 104.60 | 13.89 |
| Intrapersonal | 103.36 | 13.24 |
| Self-Regard | 103.78 | 11.99 |
| Emotional Self-Awareness | 102.22 | 15.90 |
| Assertiveness | 104.05 | 13.21 |
| Independence | 101.02 | 14.66 |
| Self-Actualisation | 100.81 | 12.84 |
| Interpersonal | 103.62 | 13.45 |
| Empathy | 100.41 | 17.29 |
| Social Responsibility | 101.88 | 13.43 |
| Interpersonal Relationship | 103.86 | 12.81 |
| Stress Management | 105.64 | 12.86 |
| Stress Tolerance | 102.78 | 13.70 |
| Impulse Control | 106.54 | 12.48 |
| Adaptability | 104.06 | 17.14 |
| Reality Testing | 102.35 | 14.37 |
| Flexibility | 104.19 | 17.04 |
| Problem Solving | 103.63 | 14.56 |
| General Mood | 101.24 | 13.31 |
| Optimism | 101.24 | 16.61 |
| Happiness | 100.82 | 13.14 |

**Table 12:** Descriptive statistics for WPI combined sample

| Scale | Mean | SD |
|---|---|---|
| Ambition | 6.78 | 1.68 |
| Initiative | 5.81 | 1.67 |
| Flexibility | 7.15 | 1.35 |
| Energy | 6.10 | 1.59 |
| Leadership | 5.86 | 1.74 |
| Persistence | 6.92 | 1.64 |
| Attention to detail | 7.27 | 1.56 |
| Rule-following | 5.76 | 1.70 |
| Dependability | 6.74 | 1.57 |
| Teamwork | 5.94 | 1.47 |
| Concern for others | 5.91 | 1.64 |
| Outgoing | 6.80 | 1.45 |
| Democratic | 7.47 | 1.44 |
| Innovation | 7.86 | 1.63 |
| Analytical thinking | 7.35 | 1.79 |
| Self-control | 7.83 | 1.51 |
| Stress Tolerance | 7.08 | 1.43 |

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## Correlations

The correlations between the scales on the WPI and EQi are reported in *Table 13*. Significant correlations were found between most of the primary scales on the WPI and the scales of the EQi. As expected, some of the highest correlations included constructs such as Self-Control on the WPI with its conceptual counterpart of Impulse Control on the EQi, with a correlation of 0.52. Similarly, the Stress Tolerance subscales on both assessments correlated 0.59 with one another. Other large correlations of >0.5 were mostly between the WPI and composite EQi scales. For example, Energy, Initiative, Persistence and Stress Tolerance correlated with total EQ (r=0.53), (r=0.51), (r=0.53) and (r=0.57) respectively. Some other interesting correlations are briefly discussed in the following section.

Concern for Others on the WPI correlated with the Interpersonal composite 0.57 on the EQi as expected. At the subscale level, Concern for Others also correlated with the Empathy 0.48, Social Responsibility 0.48 and Interpersonal Relationships 0.45, suggesting that individuals characterised by a concern for others, were likely to be empathic, have good relationships and would also have a tendency toward more pro-social behaviours. Although these scales appear to measure a very similar construct, the correlations suggest that there is some overlap however they are sufficiently different in what they measure and as such cannot be used interchangeably. General Mood also correlates with Concern for Others 0.40, suggesting that people with a higher Concern for Others are likely to be more optimistic and happy as well.

Interestingly, the Dependability scale on the WPI correlates well with the Problem-Solving 0.40, General Mood 0.43 and Optimism 0.41 scales of the EQi, thereby linking a person's ability to effectively deal with life's challenges to an individual's general well-being. The Mood scales on the EQi (General Mood, Optimism and Happiness) had good correlations with Dependability 0.43, Energy 0.44, Initiative 0.50, Persistence 0.46 and Stress Tolerance 0.44, suggesting that these are important aspects of personality related to an individuals' level of general well-being at work.

**Table 13:** Correlations between the EQi and the WPI scales

| | Teamwork | Stress Tolerance | Self-Control | Rule-Following | Persistence | Outgoing | Leadership | Innovation | Initiative | Flexibility | Energy | Dependability | Democratic | Concern for Others | Attention to Detail | Analytical Thinking | Ambition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total EQ | .303 | .574 | .471 | .261 | .531 | .314 | .316 | .434 | .512 | .289 | .533 | .477 | -.118 | .450 | .399 | .327 | .426 |
| ITR EQ | .252 | .511 | .356 | .186 | .447 | .309 | .361 | .449 | .470 | .280 | .471 | .363 | -.171 | .334 | .301 | .290 | .382 |
| SR | .211 | .401 | .338 | .174 | .313 | .242 | .228 | .311 | .340 | .185 | .322 | .209 | -.089 | .154 | .214 | .193 | .249 |
| AE | .148 | .235 | .227 | .093 | .194 | .239 | .119 | .238 | .229 | .155 | .255 | .156 | -.072 | .313 | .191 | .164 | .133 |
| AS | .240 | .434 | .288 | .198 | .398 | .310 | .334 | .434 | .372 | .204 | .398 | .281 | -.160 | .215 | .265 | .253 | .331 |
| IN | .067 | .399 | .176 | .042 | .329 | .069 | .366 | .360 | .403 | .328 | .379 | .304 | -.315 | .181 | .186 | .232 | .349 |
| SA | .207 | .378 | .243 | .150 | .421 | .233 | .305 | .349 | .410 | .205 | .392 | .385 | -.069 | .305 | .256 | .225 | .350 |
| ITE EQ | .329 | .277 | .324 | .203 | .377 | .364 | .101 | .242 | .368 | .161 | .396 | .376 | .055 | .576 | .275 | .139 | .306 |
| EM | .256 | .123 | .181 | .194 | .249 | .184 | .038 | .088 | .188 | .011 | .223 | .244 | .086 | .482 | .198 | .075 | .195 |
| RE | .239 | .163 | .227 | .178 | .308 | .167 | .024 | .139 | .277 | .090 | .272 | .338 | .043 | .476 | .263 | .105 | .233 |
| IR | .293 | .277 | .274 | .120 | .320 | .433 | .133 | .247 | .347 | .199 | .360 | .297 | .045 | .454 | .184 | .124 | .260 |
| ADP EQ | .257 | .479 | .354 | .223 | .430 | .172 | .252 | .365 | .417 | .282 | .418 | .375 | -.063 | .281 | .367 | .319 | .316 |
| PS | .278 | .429 | .311 | .264 | .445 | .173 | .229 | .367 | .390 | .180 | .390 | .399 | -.074 | .281 | .453 | .395 | .328 |
| FL | .238 | .438 | .288 | .130 | .336 | .199 | .218 | .326 | .385 | .333 | .357 | .243 | -.020 | .216 | .240 | .242 | .269 |
| RT | .149 | .412 | .335 | .222 | .390 | .114 | .245 | .284 | .323 | .163 | .383 | .394 | -.130 | .275 | .315 | .223 | .292 |
| STR EQ | .176 | .544 | .517 | .228 | .388 | .112 | .178 | .274 | .326 | .206 | .394 | .327 | -.137 | .253 | .342 | .258 | .287 |
| ST | .177 | .585 | .340 | .146 | .475 | .178 | .390 | .366 | .444 | .292 | .489 | .389 | -.205 | .245 | .288 | .297 | .415 |
| IC | .119 | .322 | .519 | .239 | .176 | .019 | -.089 | .087 | .097 | .045 | .170 | .167 | -.022 | .181 | .283 | .133 | .066 |
| GM EQ | .216 | .438 | .318 | .130 | .459 | .306 | .324 | .364 | .503 | .273 | .438 | .432 | -.099 | .396 | .274 | .254 | .391 |
| HA | .124 | .305 | .259 | .086 | .329 | .292 | .237 | .250 | .372 | .217 | .314 | .350 | -.041 | .338 | .181 | .141 | .271 |

*Note: Correlations greater than .12 are significant at the p<.01 level

**Psychometrics**
BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

Thirteen of the EQi scales had correlations of >0.30 and higher with the Stress Tolerance scale of the WPI. In effect, this included Total EQ, the Intrapersonal (except Emotional Self Aware-ness), Adaptability, Stress Management, and General Mood composites as well as all of their subscales. The Interpersonal composite on the EQi was also significantly correlated to Stress Tolerance on the WPI however it did not display the same robust relationship as the other EQi scales.

## Factor analysis

In order to determine whether any special factors could be identified from both the WPI and EQ-i, the scales from both assessments were included in a principal axis factor analysis with Oblimin rotation. Based on Kaiser's criterion of eigenvalues-greater-than-unity, six factors were extracted that explained 62.10% of the variance in the correlation matrix. The pattern matrix is shown in Table 14.

The first factor was easily identified as an emotional intelligence factor, as all of the scales of the EQ-i had salient primary loadings on this factor, apart from Empathy, Social Responsibility and Impulse Control. This is an important finding in that it shows that emotional intelligence remains a separate construct from personality, although there are relationships with many of the WPI scales.

The second factor was made up of the Empathy, Social Responsibility and Interpersonal Relationship scales of the EQ-i and the Concern for Others scale from the WPI. All scales had salient loadings on this factor, although Social Responsibility had a secondary loading. These scales appear to represent the Big Five factor of Agreeableness. For the ease of reference, it was proposed that this factor be called Empathy.

The third factor consisted of most of the WPI scales. Only Concern for Others, Democratic, Outgoing, Rule Following, Self Control, and Teamwork did not have salient loadings on this factor. It is proposed that this represents a cluster of what may be leadership characteristics, and was therefore tentatively called Leadership.

**Table 14:** Interbattery factor analysis of the WPI and EQ-i scales

| Scale | EQ | Empathy | Leadership | Adjustment | Social Orientation | Diligence |
|---|---|---|---|---|---|---|
| Self Regard | **.697** | -.120 | .007 | -.084 | .085 | -.057 |
| Emotional Self-Awareness | **.614** | .080 | -.152 | -.112 | .050 | .017 |
| Independence | **.377** | -.004 | .251 | -.158 | -.238 | .182 |
| Assertiveness | **.622** | -.144 | .169 | -.078 | .069 | -.054 |
| Self Actualisation | **.702** | .127 | .095 | .058 | -.033 | -.035 |
| Empathy | .017 | **.753** | -.014 | .034 | .042 | -.023 |
| Social Responsibility | .070 | **.799** | -.005 | -.042 | -.050 | .006 |
| Interpersonal Relationship | **.549** | **.435** | -.072 | .113 | .221 | .058 |
| Stress Tolerance | **.441** | .021 | .252 | -.287 | -.126 | .103 |
| Impulse Control | .113 | .022 | -.206 | **-.828** | -.073 | -.035 |
| Reality Testing | **.539** | .087 | .024 | **-.341** | -.188 | -.049 |
| Problem Solving | **.374** | .183 | .208 | -.192 | -.056 | -.118 |
| Flexibility | **.338** | -.006 | .121 | **-.317** | .061 | .146 |
| Happiness | **.596** | .243 | .024 | .129 | .037 | .029 |
| Optimism | **.391** | .224 | .234 | -.032 | -.023 | .050 |
| Ambition | .009 | .129 | **.699** | .051 | -.023 | .041 |
| Analytical Thinking | -.036 | -.022 | **.571** | -.107 | .026 | -.058 |
| Attention to Detail | .018 | .082 | **.491** | -.157 | -.022 | **-.468** |
| Concern for Others | -.028 | **.515** | .231 | -.121 | .172 | .028 |
| Democratic | -.106 | .093 | -.256 | -.016 | **.438** | -.050 |
| Dependability | .005 | .279 | **.610** | -.033 | -.120 | -.188 |
| Energy | .069 | .105 | **.671** | -.079 | .104 | .022 |
| Flexibility | -.021 | .043 | **.374** | -.117 | .045 | **.566** |
| Initiative | .113 | .104 | **.668** | .017 | .055 | .154 |
| Innovation | .176 | -.107 | **.564** | -.011 | .147 | .069 |
| Leadership | .196 | -.118 | **.571** | .188 | -.060 | .166 |
| Outgoing | .276 | -.027 | .088 | .096 | **.700** | .025 |
| Persistence | .065 | .137 | **.711** | -.043 | .012 | -.219 |
| Rule Following | .085 | -.001 | .226 | -.106 | .082 | **-.672** |
| Self Control | -.005 | .073 | .173 | **-.556** | .260 | -.108 |
| Stress Tolerance | .072 | -.052 | **.554** | **-.374** | .137 | .101 |
| Teamwork | -.007 | .062 | .238 | -.124 | **.626** | .001 |

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

The fourth factor was negatively correlated with the other factors, and consisted of the Impulse Control, Flexibility and Reality Testing scales of the EQ-i and Self Control and Stress Tolerance scales of the Adjustment global scale of the WPI. All of these scales had salient negative loadings on the factor, although the loadings of Flexibility, Reality Testing and Stress Tolerance were secondary loadings. The content of the factor appears to represent that of the Big Five factor of Neuroticism. However, if a person were to obtain high scores on each of these scales, they might be described as resilient or emotionally adjusted. It is proposed that this factor be named Adjustment.

The Democratic, Outgoing and Teamwork scales of the WPI all had primary salient loadings on the fifth factor. These scales all form part of the global Social Orientation scale, although Concern for Others does not load on this factor. While it might be more appropriate to name this factor Working with Others, Social Orientation was retained as a name for this factor.

The last factor was made up of the Attention to Detail and Rule Following scales of the Conscientiousness global scale of the WPI, which had salient negative loadings, and the Flexibility scale from the Achievement Orientation global scale, which had a salient positive loading. While it does appear to capture elements of Conscientiousness, it does not appear to represent the entire scale. It is suggested that it be called Diligence, characterised by high scores on Attention to Detail and Rule Following and low scores on Flexibility.

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## Summary

The results presented in this Technical Report show good evidence for the construct validity of the Work Personality Index in the South African context. However, users of this instrument should use caution when interpreting scores, since only North American norms are presently available and the current study demonstrates that South Africans typically score higher on all of the WPI scales*. Scores may therefore seem artificially inflated, but this will not adversely influence relative comparisons between South African incumbents.

By means of a Principal Components Analysis it was possible to replicate the factor structure reported in the manual. Four of the WPI scales did not have primary loadings on its expected components, but all had salient loadings on those components.

Rasch analysis was conducted and the number of items that misfit in every scale was identified and Differential Item Functioning for men and woman was investigated. In addition, category probability curves were generated to examine the response styles on each of the scales of the WPI.

With regard to differences between gender and age groups, no real differences in performance on the WPI between men and woman as well as between different age categories were found.

Correlations between the EQi and WPI found good relationships between the scales as expected. The level of correlation between the two instruments was such that it demonstrated differentiated and independent construct measurement. The combined factor analysis also demonstrated that emotional intelligence remains distinct from personality. Certain areas of overlap were identified between the two assessments that could prove fruitful when interpreting both assessments together.

*South African norms were developed and implemented in 2010*

**Psychometrics**

BUILDING BETTER ORGANIZATIONS THROUGH PEOPLE

## References

Bakker, S., Macnab, D. (2001). *Work Personality Index Users Manual*. Canada: Psychometrics Canada Ltd.

Bar-On, R. (2002). *BarOn Emotional Quotient Inventory*: Technical manual. United States: Multi Health Systems Inc.

Cattell, R.B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research*, 1, 245-276.

Cohen, J. (1988). Statistical power analysis for the behavioural sciences (2nd ed.). hillside, NJ: Lawrence Earlbaum Associates.

Cohen, J. (1992). Statistics a power primer. *Psychology Bulletin*, 112, 155–159.

Eysenck, H.J. (1992). Four ways five factors are not basic. *Personality and Individual Differences*, 13, 667-673.

Kaiser, H.F. (1970). A second generation Little-Jiffy. *Psychometrika*, 35, 401-415.