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THE COMPARABILITY OF THE CONSTRUCTS OF THE 16PF IN THE SOUTH AFRICAN CONTEXT

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ABSTRACT

The primary aims of the study were to determine whether the scores of the 16PF (SA92) are comparable in a cross-cultural setting in South Africa, and also to investigate the influence of the gender of the research participants on the scores of the 16PF (SA92). The sample consisted of 983 students who were enrolled at different universities at the time of the field work. The statistical methods involved the application of descriptive statistics as well as methods to determine the comparability of the constructs. The results showed that although race exercised a considerable influence on the findings, this was not necessarily the case as far as gender was concerned. The presence of problems relating to the construct comparability of the test were also identified, as significant differences in means were found between the different race groups. Some of the implications of persisting with the use of the 16PF (SA92) in the South African context are outlined against the background of recently promulgated labour legislation.

OPSOMMING

Die primêre doelstellings met die onderhawige studie was om die toepaslikheid van die 16PF (SA92) in Suid Afrikaanse konteks met sy diversiteit van kultuurgroepe te evalueer. Die invloed van die geslag van die navorsingsdeelnembers op die resultate is ook nagevors. Die deelnemergroep het bestaan uit 983 studente wat ten tye van die veldwerk aan verskillende universiteite gestudeer het. Benewens normale beskrywende statistiek, is daar ook gebruik gemaak van metodes om konstrukvergelykbaarheid te evalueer. Die bevindings het daarop gedui dat alhoewel ras 'n belangrike invloede op die toetsfaktore uitoefen, dit nie die geval is in soverre dit geslag betref nie. Die teenwoordigheid van probleme het ook ten opsigte van konstrukvergelykbaarheid na vore getree, aangesien betekenisvolle verskille tussen gemiddeldes gevind is. Sommige van die implikasies van die volgehoue gebruik van die 16PF (SA92) in Suid Afrika word ook in die lig van die resente arbeidswetgewing bespreek.

In 1991, Taylor and Boeyens investigated the comparability of the South African Personality Questionnaire and came to the conclusion that it is:

> ...important that a new South African personality assessment instrument be constructed for there is no instrument that one can confidently recommend for general use at this stage (p.9).

Despite the election of a new Government, the promulgation of new Labour Relations Act and the publication of the Employment Equity Bill the recommendations of Taylor and Boeyens have not been heeded. This has led to a situation in which the use of a number of personality tests, which have not been properly validated to be used in selection decisions within a multicultural context, is still rife. One such test which enjoys a good deal of popularity is the Sixteen Personality Factor Questionnaire (16PF). The 16PF is a paper-and-pencil test designed to measure personality traits and, it is claimed, behavioural styles. The first version of the instrument was developed by Cattell in the USA in 1949 and exported, often without reconfirming the factor structure, to a number of countries (Cattell, Eber & Tatsuoka, 1992). From 1961 onwards, starting with Levonian's attempt to replicate Cattell's factor structure, a number of researchers have failed to confirm Cattell's original findings. This has led to a great deal of criticism against the 16PF in terms of issues such as validity, item structure and its theoretical framework (e.g. Barret & Kline, 1982; Bouchard, 1972). Although some researchers (Kline, 1967; Tsijioka & Cattell, 1965; Zak, 1976) have found non-significant cross-cultural factor structure differences, larger numbers of researchers, in a number of countries, have demonstrated that cross-cultural differences do indeed occur (e.g. Adcock, 1974; Adcock & Adcock, 1977; Golden, 1978; Mehryar, 1972; Phillip, 1972; Thompson & Dayries, 1975; Vaughan & Cattell, 1976). In fact, in their 1992 handbook, Cattell et al. wrote that '... highly significant differences have been found cross-culturally on factor levels, related to cultural dynamics...' (p.xxi).

At the time that the present investigation was conducted there were four forms of the test available in South Africa. Until 1992, Form A and Form B of the test, which were standardised on white South African populations, were the only two forms available in South Africa. They were used mainly in industry to aid with selection and promotion decisions. Form E and Form SA92 were developed with the aim of trying to ensure that they would be appropriate for all groups in South Africa (Prinsloo, 1992). As far as could be established, only four research articles have been published concerning the appropriateness of personality tests in South African (Prinsloo & Van Eeden, 1995; Spence, 1982; Taylor & Boeyens, 1991; White, 1982). Of these, the Prinsloo and Van Eeden paper was the only one which focussed on the 16PF. Test users in South Africa have largely relied on research findings from the USA to justify the appropriateness of their use of the 16PF.

A vexed issue in the area of cross-cultural research is whether the use of personality tests which were developed in a one cultural environment, may justifiably be used in a different one

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without conducting the necessary research (Rogers, 1972). Such research must demonstrate that the psychological constructs applicable in the culture of origin have equivalent counterparts in the target culture. Pooringa and Van der Vijver (1987) went even further by suggesting that when examining cross-cultural differences, it is important to consider and measure the influence of context variables (e.g. degree of urbanisation, socioeconomic status, level of education, and so on) on observed differences in test scores.

The principle aim of this study was to determine whether the scores of the 16PF (SA92) are comparable in a cross-cultural setting in South Africa – in other words, to establish the suitability of the 16PF for the coloured, Indian and black sectors of the population, and also to assess the influence of gender on the scores of the 16PF (SA92). Establishing the cross-cultural comparability of psychological tests is of major importance in South Africa. According to Nzimande (1995) the test movement is obliged to acknowledge the influence of the changing context of society in present-day South Africa. His view in this regard is clearly reflected in the following statement:

> The constant refusal of psychometrics to confront these social questions is also very problematic... Unlike in the past, psychologists in this country have to start being accountable for their actions (Nzimande, 1995, p.9).

RESEARCH DESIGN

Sample

The sample consisted of 983 Industrial Psychology or Psychology students at the Universities of the Western Cape (UWC), Pretoria (UP), Durban-Westville (UDW), and Natal (UND). As the main aim of the study was to determine the cross-cultural comparability of the 16PF, it was essential that sub-samples had to be drawn which reflected the various race groups in South Africa as defined by the now defunct Population Registration Act (No.30 of 1950). The distribution of the sample for race and gender is shown in Table 1.

TABLE 1
DISTRIBUTION OF ACCORDING TO RACE AND GENDER FOR TOTAL SAMPLE

Gender	Race				
	Black	Coloured	Indian	White	Total
Male	135	126	54	85	400
Female	118	126	175	164	583
Total	253	252	229	249	983

Instrumentation

The 16PF (SA92) and a biographical questionnaire were used to collect the data for this investigation. According to Cattell *et al.* (1992), the 16PF is a set of 16 questionnaire scales, designed to make available information about an individual on the majority of primary personality factors. It covers 16 bipolar source traits (primaries) and eight derivatives thereof, which are referred to as second-order factors (secondaries). The labelling of the source traits by Cattell and his coworkers in a manner most readily understood is warmth, intelligence, ego strength, dominance, impulsivity, conformity, boldness, emotional sensitivity, suspiciousness, imagination, shrewdness, guilt proneness, rebelliousness, self-sufficiency, ability to bind desire, and free-floating anxiety.

According to Prinsloo (1992), the 16PF (SA92) adheres to the format of the American test, and all the items which were used in the local version of the test are also to be found in the original version test. On these ground he appears to have accepted that the background, conceptualisation and rationale may be transferred to the South African situation without there being a need for any adaptation. After standardising the test on a norm groups that consisted of black, coloured, Indian and white people, he concluded that it measured the same constructs for the four subgroups in question. Prinsloo's (1992) point of view was disputed by Abrahams (1994) who viewed the composition of the norm group as problematic: certain groups were grossly under-represented (particularly the blacks), and she therefore called Prinsloo's view on the construct comparability of the test into question.

Methods and Techniques

Means and standard deviation were computed, and significance tests were conducted using one and two-way analysis of variance as dictated by the nature of the data. An extremely stringent significance level for rejecting an hypothesis of no difference was set a $p \leqslant 0{,}001$. Construct comparability was evaluated by computing Cronbach's alpha coefficients of internal consistency for the factors, and by respectively conducting item and factor analyses. The factor analyses were conducted using Jöreskog's (1963) factor estimation procedure, followed by Browne's (1972a, 1972b) procedure for rotating a factor matrix to a partially specified target matrix. The purpose of this technique is to establish the extent to which empirical data match the structure of a conceptual model. These procedures were carried out for each of the four subsamples.

RESULTS

Descriptive statistics (means and standard deviations) for the first and second-order factors for the four race groups (blacks, coloureds, Indians and whites) are presented in Table 2. The Motivational Distortion (MD) factor is also included. Similar statistics for gender groups are shown in Table 3.

The results reports in Table 2 showed that statistically significant differences between means were associated with the race, which may well indicate that the cultural group from which a person originates has a significant influence on the manner in which test takers deal with the items in the 16PF. Significant differences were found between 10 of the first-order and all the second-order factor means. Large differences in standard deviations were also observed on the majority of factors. The gender variable reported on in Table 3 did not have nearly as severe an influence on the mean test scores as the variable 'race'. Significant gender differences were found on factors I, O,N, Emotional Sensitivity and Tough Poise.

The alpha coefficients for the total sample and for the four subsamples are shown in Table 4, while those for males and females appear in Table 5. The coefficients of internal consistency were unacceptably low for blacks on 14 of the first-order factors. Only Factors H, Q2 and Q3 had coefficients greater than 0,50. Factors C, F, M, N and O showed the poorest levels of internal consistency with coefficients of less than 0,30 for the black subsample. On the whole, the coloured, Indian and white subsamples yielded higher coefficients of internal consistency with none of the coefficients lower than 0,30. The alpha coefficients which were computed for the white subsample were the highest and also the closest to the coefficients reported by Prinsloo (1992) for the norm group.

The alpha coefficients which were computed for the female and male subsamples in the current investigation were lower than those reported for the norm group by Prinsloo (1992). In the case of the female subsample, coefficients lower than 0,50 were found for seven of the first-order factors whereas in the case of the male subsample eight of the coefficients were lower than 0,50. Although the results between the gender subgroups were similar, males obtained slightly lower coefficients than the females on the majority of the factors.

TABLE 2
MEANS AND STANDARD DEVIATIONS OF 16PF SCORES FOR BLACK, COLOURED, INDIAN AND WHITE GROUPS.

	Blacks		Coloureds		Indians		Whites			
Factor	Mean	sd	Mean	sd	Mean	sd	Mean	sd	F	p
A	9.98	2.87	10.07	3.41	9.71	3.13	11.93	3.42	24.53	⩽0.0000
B	7.06	1.85	7.99	1.83	7.66	1.81	9.08	1.57	57.72	⩽0.0000
C	8.36	2.63	9.98	3.83	9.38	3.63	11.99	3.64	48.65	⩽0.0000
E	12.76	3.34	12.87	3.92	1.70	3.70	13.55	3.89	2.76	0.0401
F	8.87	2.60	10.34	3.52	11.20	3.27	11.82	3.14	41.40	⩽0.0000
G	12.13	3.05	10.80	3.79	10.07	3.49	10.70	4.40	13.33	⩽0.0000
H	9.00	3.34	9.19	4.10	9.40	3.78	10.49	4.11	6.74	0.0002
I	11.62	3.35	12.88	3.74	14.23	3.44	14.28	3.99	30.09	⩽0.0000
L	13.15	3.36	12.46	3.78	12.56	3.43	10.69	3.89	21.43	⩽0.0000
M	12.06	2.82	11.62	3.65	13.21	3.71	12.64	4.23	8.71	⩽0.0000
N	17.12	3.36	15.89	3.36	15.87	3.45	16.96	3.65	6.22	0.0003
O	9.07	2.67	7.98	3.88	8.80	3.62	7.47	4.14	10.33	⩽0.0000
Q^1	12.33	2.88	11.70	3.65	12.31	2.96	11.49	3.81	3.99	0.0077
Q^2	6.89	4.12	9.62	3.89	9.82	3.52	9.04	4.29	28.42	⩽0.0000
Q^3	11.62	3.99	10.08	3.72	10.08	3.72	11.25	4.07	7.40	⩽0.0001
Q^4	8.03	3.03	8.24	3.68	8.28	3.25	8.00	3.84	0.41	0.7487
Motivational distortion	4.81	2.05	4.70	2.48	4.02	2.33	5.37	2.53	13.15	⩽0.0000
Extraversion	8.94	2.11	8.77	2.70	8.84	2.36	9.94	2.72	12.04	⩽0.0000
Anxiety	6.45	1.90	5.97	2.95	6.43	2.62	4.97	3.06	16.30	⩽0.0000
Emotional sensitivity	7.13	1.75	6.98	2.58	7.85	2.43	6.86	2.66	8.09	⩽0.0000
Independence	8.58	1.48	9.20	2.17	9.79	1.89	9.40	2.37	15.44	⩽0.0000
Compulsivity	13.63	2.43	12.75	2.70	12.01	2.61	12.97	3.03	14.57	⩽0.0000
Tough poise	−0.22	1.84	−0.52	2.30	−1.39	2.06	1.95	2.38	33.90	⩽0.0000

TABLE 3
MEANS AND STANDARD DEVIATIONS OF 16PF SCORES FOR MALES AND FEMALES.

	Males		Females			
Factor	Mean	sd	Mean	sd	F	p
A	9,94	3,30	10,77	3,31	4,79	0,0001
B	7,92	2,03	7,97	1,83	0,23	0,6639
C	10,00	3,75	9,89	3,67	0,24	0,6251
E	14,07	3,65	12,90	3,78	0,48	0,4866
F	10,17	3,46	10,79	3,22	8,20	0,0042
G	10,95	3,71	10,95	3,84	0,00	0,9966
H	9,61	3,81	9,43	3,23	0,48	0,4887
I	11,25	3,63	14,58	3,29	223,04	⩽0,0000
L	12,43	3,66	12,07	3,78	2,22	0,1367
M	12,07	3,60	12,56	3,71	4,27	0,0389
N	17,22	3,39	16,27	3,38	18,34	⩽0,0000
O	7,56	3,52	8,84	3,68	30,13	⩽0,0000
Q^1	12,11	3,43	11,84	3,33	1,52	0,2183
Q^2	8,58	4,15	8,98	4,11	2,31	0,1287
Q^3	11,52	3,61	10,60	3,87	14,06	0,0002
Q^4	7,73	3,34	8,41	3,53	9,15	0,0025
Motivational distortion	5,06	4,52	5,35	2,41	12,30	0,0005
Extraversion	9,04	2,54	9,18	2,53	0,71	0,3991
Anxiety	5,64	2,64	6,17	2,77	8,93	0,0028
Emotional sensitivity	6,52	2,32	7,65	2,36	55,96	⩽0,0000
Independence	9,18	2,07	9,26	2,04	0,48	0,4890
Compulsivity	13,28	2,69	12,61	2,78	12,07	0,0005
Tough poise	−0,09	2,21	−1,64	2,07	125,91	⩽0,0000

TABLE 4
16PF ALPHA COEFFICIENTS FOR THE TOTAL SAMPLE AND THE FOUR SUBSAMPLES

Factor	Total sample	Black	Coloured	Indian	Black
A	0,53	0,31	0,54	0,46	0,64
B	0,44	0,34	0,41	0,36	0,50
C	0,69	0,26	0,69	0,69	0,71
E	0,56	0,43	0,61	0,59	0,59
F	0,63	0,29	0,68	0,68	0,69
G	0,58	0,41	0,57	0,52	0,70
H	0,74	0,56	0,79	0,76	0,80
I	0,55	0,35	0,52	0,52	0,62
L	0,47	0,32	0,50	0,41	0,50
M	0,40	0,02	0,40	0,46	0,56
N	0,36	0,22	0,32	0,39	0,47
O	0,66	0,25	0,70	0,69	0,76
Q^1	0,48	0,30	0,55	0,41	0,58
Q^2	0,62	0,63	0,55	0,48	0,66
Q^3	0,64	0,56	0,67	0,61	0,71
Q^4	0,58	0,46	0,64	0,55	0,66
Motiv dist	0,40	0,32	0,30	0,40	0,50

In conducting the factor analyses, the values obtained on the measure of sampling adequacy (MSA) indicated that the subsamples did not measure up to the requirements for a factor analysis, although the combined sample complied with the MSA cut-off levels. In spite of the less than adequate MSA's, it was decided to continue with the factor analysis procedure for the four subsamples, although it was quite evident that the findings deriving from such analyses would have to be interpreted with a great deal of circumspection.

TABLE 5
ALPHA COEFFICIENTS FOR THE 16PF SCALES FOR FEMALES AND MALES

Factor	Females	Males
A	0,55	0,49
B	0,39	0,49
C	0,68	0,66
E	0,57	0,53
F	0,63	0,64
G	0,60	0,55
H	0,75	0,72
I	0,44	0,46
l	0,49	0,43
M	0,42	0,37
N	0,34	0,37
O	0,68	0,62
Q^1	0,47	0,49
Q^2	0,63	0,61
Q^3	0,65	0,63
Q^4	0,61	0,54
Motivational distortion	0,45	0,31

A loading of $\geqslant 0,3$ was arbitrarily set as acceptance level for an item in the resulting target matrix to judge whether the item could be accepted as complying with the theoretical model. When the matrices which had been rotated to target were inspected (for complete matrices see Abrahams, 1996), it was evident that substantial differences existed in the factor patterns which had been extracted for the black, coloured, Indian and white students. With the total sample, 59 (36,87%) of the items loaded as might have been expected in terms of the model. The target rotation for the black subsample showed that only 32,5% (52 of 160) of the items loaded as expected, while in the case of the coloured subsample it was 41,87%, 38,75% (67) for the Indian subsample, and (53,13%) for the white subsample.

The item-factor correlations from the item analyses are shown in Tables 6 and 7. The reason for presenting the findings in this manner is simply to facilitate comparison with Prinsloo's (1992) results which were documented it in a similar manner. All items with factor loadings of less than 0,30 were regarded as poor, and consequently included in these tables.

TABLE 6
ITEMS WITH ITEM-TOTAL CORRELATIONS BELOW THE CUT-OFF LEVEL FOR THE FOUR RACE GROUPS

Factor	Black	Coloured	Indian	White
A				
B	68,98,99,131	3,4,98,131	36,99	3,36,98,130
C	6,37			
E	7,135			
F				
G	44,75			
H				
I	47,143			
L	17,50,82,113	18	17,18,113	18,82
M	19,83,84,146, 147	116,148	21,148	
N	55,117,150	117,118,216	86,149	85,149
O	152			
Q^1	89		27,89,90	
Q^2	123	156		
Q^3			97	97
Q^4				
Mot dist	31,61,64	31,64,160	31,64,160	31,64,160

Table 6 indicates that as far as the results of the item analysis for the black group are concerned, as many as 18% of the total number of items in the test failed to attain satisfactory item-total correlations. For this group, Factors B, L and M performed the worst. In the case of the coloured, Indian and white subsamples, the observed item-total correlations were similar to those that Prinsloo (1992) had reported for the norm group.

The item analyses showed that for the female subsample, Factors A, N and MD (motivational distortion) performed the worst, with 7,5% of the total number of items not meeting the cutoff level for acceptable item-total correlations. The values for males were somewhat worse than those for the females with 11,9% of the item-total correlation coefficients lower than 0,30. In this case Factors L, M, N and MD (motivational distortion) were the worst performers.