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THE COMPARABILITY OF THE CONSTRUCT VALIDITY OF SCHEPERS' LOCUS OF CONTROL INVENTORY FOR FIRST AND SECOND LANGUAGE RESPONDENTS

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ABSTRACT

The study investigated the construct validity of the Locus of Control Inventory (LCI) for first and second language respondents. The results of confirmatory factor analysis revealed differences in the construct validity of the LCI for the first language (n=357) and second language (n=387) respondents. Item discrimination values, scale reliabilities and factor structures revealed that the three hypothesized domains, (namely external locus of control, internal locus of control and autonomy) underlying the LCI could be confirmed for the first language group, but not for the second language group.

OPSOMMING

Die studie het die konstrukgeldigheid van die Lokus van Beheer Vraelys (LBV) vir eerste en tweede taal respondente ondersoek. Die resultate van 'n bevestigende faktorontleding het verskille in die konstrukgeldigheid van die LBV vir eerste (N=357) en tweede taal (N=387) respondente blootgelê. Itemdiskriminasie waardes, skaalbetroubaarhede en faktorstrukture het onthul dat die drie hipotetiese gebiede, (naamlik eksterne lokus van beheer, interne lokus van beheer en outonomie) wat onderliggend is aan die LBV, bevestig word vir die eerste taal groep maar nie vir die tweede taal groep nie.

Locus of control is defined as a generalized expectancy of the extent to which a person perceives that events in his/her life are consequences of his/her behaviour (Rotter, 1966). People described as having an internal locus of control, believe that they can exercise some or a lot of control over events affecting them. By contrast, people who have an external locus of control, tend to believe that they have little or no control over what happens to them. These expectancies are perceived to be the result of many past experiences.

The "locus of control" construct is derived from the Social Learning Theory developed by Rotter (1975). This theory introduced the variable of expectancy and focused on three other general classes of variables, namely behaviours, reinforcements and psychological situations. Rotter gave a central role to expectancy, which is one's belief or subjective judgment that, in a certain psychological situation, a particular behaviour leads to reinforcement. He added that no individual interprets any event or situation in exactly the same way. For one person a situation might look rewarding whereas other individuals might interpret the same event completely differently (Hall and Lindzey, 1985).

According to Schermerhorn Hunt and Osborn (1997), people have personal conceptions about whether the outcomes of their actions are dependent on what they do (an internal orientation) or on factors outside of their personal control (an external orientation). Wise (1999) adds that a person's locus of control has a significant effect on his/her daily life. People with an external locus of control believe that their own actions do not influence future outcomes. This makes such people less likely to work to reach their full potential, due to the motivational, emotional and cognitive deficits that such a perception creates. People with an internal locus of control are more likely to see the world as capable if being adapted. They believe that hard work and personal abilities will lead to positive outcomes.

The Locus of Control Inventory (LCI) developed by Schepers (1995) is based on the Social Learning Theory and Attribution Theory. Schepers outlines the perception of Locus of Control in terms of the Social Learning Theory as the way in which reinforcement from the social environment takes place, and the effect such reinforcement has on future behaviour. According to Schepers (1995), Social Learning Theory, in conjunction with Attribution Theory, explains the way in which a person selects information according to inherently stable or invariant characteristics.

The Locus of Control Inventory measures three factors, namely Internal Control (the individual believes that outcomes are a consequence of his/her own behaviour); External Control (the individual believes that outcomes are independent of his/her own behaviour) and Autonomy (the individual has an internal locus of control and prefers to work alone) (Schepers, 1995). The LCI was standardized for first-year students whose home language was either predominantly Afrikaans or English (Schepers, 1995).

There are various factors that could cause test differences, including differences in terms of testees' culture, socio-economic status, language and cognitive style. Owen and Taljaard (1996) have suggested that questions must be asked in such a way that every testee can understand what is expected of him/her in the test situation and can respond freely and comfortably. If that is not done, the language used in the test can contribute to bias. They also emphasize the importance of language proficiency as an influencing factor in differences between cultural groups with regard to test reliabilities and factor structures.

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Horne (2001) investigated job seekers in the South African context with credentials that are not commensurate with their literacy skills. He refered to these incompetent job seekers as language transferees. His studies have shown that the average English language proficiency of Grade 12s in South Africa who indicate an African language as their first language is below the acceptable functional literacy level based on the English Literacy Skills Assessment (ELSA). Horne indicates that only 18% to 19% of school-leavers (n=988) who applied for admission to Technikons during 1999 and 2000 can be considered functionally literate in English (Grade 8 or above). A study done in a "class" of matriculants from the year 2000 (n=1099) enrolled at a traditionally White metropolitan university revealed that only 20% of these students were functionally literate in English at a Grade 10 level or higher. Schaap Buys Olckers (2003) found lower LCI reliabilities and construct validity for testees who could not complete the LCI in their first language.

The objective of this study was to determine the construct validity of the LCI inventory for first and second language respondents. Cronbach and Meehl (1955) and Owen and Taljaard (1996) define construct validity as the degree to which a test measures a theoretical construct or trait. According to these authors, construct validity is important when the test user wants to evaluate the degree to which a certain trait or construct presumed to be reflected in the test construct, is in fact present in the testee.

RESEARCH DESIGN

Subjects
First and second year students registered with the Faculty of Economic and Management Sciences at the University of Pretoria and Technikon Pretoria participated in the study during the 2001 academic year. A convenience sample of 744 students completed the LCI during formal lecture time. The sample consisted of 357 first language respondents (English and Afrikaans), and 387 second language respondents (mainly with an African language as their first language). Personal data for research purposes was provided on a voluntary basis. All data were dealt with in a confidential manner.

Measuring instrument
The Locus of Control Questionnaire (Schepers, 1999) was used. As it is a normative instrument, it can be used for inter-individual comparison. A factor analysis of the scale yielded three factors, namely Internal Locus of Control, Autonomy, and External Locus of Control. Each of these factors defines a separate scale. The three scales were each subjected to an item analysis.

The Locus of Control Inventory consists of 88 items, each in the form of a seven-point scale. The reliabilities of the scales were determined using Cronbach's coefficient alpha (Schepers, 1999). In his 1999 study Schepers reported high reliability coefficients for the Autonomy (0.88), Internal Locus of Control (0.83) and External Locus of Control (0.87) scales.

Data analysis
The construct comparability of the LCI for first and second language respondents was evaluated by computing coefficients for internal consistency (alpha) and by conducting item and factor analyses respectively. The SPSS (Statistical Package for the Social Sciences) and the EQS program were used to do the required analyses.

The Principal Axis Factoring (PAF) extraction method and direct oblique rotation were used to generate the hypothetical factor solutions for the LCI (Tabachnick and Fidell, 1989). In accordance with the rational construct approach, the amount of defined theoretical constructs was used to determine the number of factors for rotation purposes (Owen and Taljaard, 1996).

Four criteria were used in the factor analysis to confirm the significance of the factors and the comparability of the factors between groups. The first criterion was the extent to which the factor groupings that were anticipated were confirmed in the factor analysis for the groups that were compared. Secondly, the extent to which the number of significant factors and the variances explained was similar for both groups was examined. Thirdly, it was important that the factor solutions were clear or welldefined and equally interpreted for both groups, and lastly, the factor loadings had to be similar for the groups being compared (De Vellis, 1991).

To verify the amount of significance of factors, the parallel method of Horn (1965), the scree-plots of Cattell (1966), and Kaiser's (1961) criterion were used in this study. According to Zwick and Velicer (1986), Horn's method provides the most accurate estimation of the number of true factors in a complex data set. The congruence coefficient of Tucker (1951) was used to calculate the level of congruence of the rotated factor solutions for the two groups, indicating the level of factor stability across groups.

Confirmatory structural modelling was conducted as an additional measure to test the extent to which the data fitted the proposed LCI model (Rigdon, 1996). Maximum likelihood estimation was used employing the EQS structural equation software. The Bentler-Bonnett normed fit index (NFI) and non-normed fit index (NNFI), the Comparative Fit Index (CFI), the Bollen Non-normed Fit index (IFI), the Root Mean Squared Error of Approximation (RMSEA), and the Model Chi-square were used as model fit indices (Kelloway, 1998; Medskar, Williams and Holahan, 1994).

Item aggregate values (item parcels) were calculated to control for artefacts in item groupings or factors that have no psychological importance due to the effect of differential item skewness (Comrey and Lee, 1992; Gorsuch 1997). Bagozzi and Heatherton (1994) indicate that the indices obtained from a Confirmatory Factor Analysis could be an underestimation of the model fit values. This could happen when factors contain a large number of items. Bagozzi and Heatherton (1994) have proposed the calculation of item aggregates to obtain more accurate estimates of model fit indices. Item aggregates were built according to rational and theoretical criteria. The assumption was made that each item is an alternative (but equivalent) indicator of the construct to which it has been allocated. The LCI was divided into 23 aggregates of which 19 consisted of four items each and six consisted of three items each. Table 1 indicates how the items were allocated to form aggregates.

RESULTS

The descriptive statistics for the LCI scales for the first and second language respondents are set out in Table 2. The standard deviation statistics indicate that the first language respondents obtained more homogeneous scores on the Internal Locus of Control scale than second language respondents.

The effect sizes, as described by Cohen (1988), were calculated to determine the practical significance of mean score differences. Table 2 indicates that both Autonomy and External Locus of Control scales reflect small effect sizes and that the Internal Locus of Control scale reflects a medium effect size. The differences between the groups in

Table 1
Item aggregates for the LCI

Autonomy (34 items)					Internal locus of control (26 items)					External locus of control (28 items)				
Aut1	1*	2	3	5	Int1	6	7	8	10	Ext1	4	9	12	20
Aut2	11*	13	14	15	Int2	18	19	26	27	Ext2	34	35	36	38
Aut3	16	17	21*	22	Int3	31	32	33	37	Ext3	41	43	45	47
Aut4	23	24	25	28	Int4	40	42	48	49	Ext4	50	51	52	53
Aut5	29	30	39*	44	Int5	54	55	59	60	Ext5	56	57	58	65*
Aut6	46	62	64	66	Int6	61	63	69	75	Ext6	72	77	79	
Aut7	67	68	70	71	Int7	76	85	86	87	Ext7	80	84	88	
Aut8	73*	74	78	*										
Aut9	81	82	83											

* Reflected items

respect of both the Autonomy and External Locus of Control scales are of small practical significance. It should be noted that the differences between the second and first language groups on the Internal Locus of Control scale could be of practical significance when cross-language comparisons are made.

Table 2
Descriptive statistics in respect of the LCI scales

Second language group (n=387)			First language group (n=357)			Difference in means
	SD	Mean		SD	Mean	Effect size
Autonomy	166,876	20,518	Autonomy	170,373	19,714	-0,17
Internal	153,84	21,40	Internal	162,868	14,3975	-0,49
External	95,775	19,115	External	91,1961	20,667	0,23

The results for the item analysis for Autonomy for the different groups are set out in Table 3. There were 11 items (32% of the items) that had an item total correlation (discrimination value) lower than 0,20 for second language respondents. A discrimination value of below 0,20 is generally not considered acceptable (Anastasi, 1990; De Vellis, 1991; Anastasi and Urbina, 1997). The items with the low item total correlations also have relatively low item reliabilities. With reference to the first language group, most of the items appear to have acceptable discrimination values and item reliabilities. The alpha coefficients for second language and first language respondents are 0,78 and 0,86 respectively. This can be regarded as a recognisable difference in reliabilities, considering the length of the scale and the equal standard deviations of the scale scores for the groups. The results of the item and reliability analysis for the Autonomy scale imply differences in the construct for the two groups.

The item-analysis results for the Internal Locus of Control scale are set out in Table 4. All the item-total correlations are above 0,20 for both the second and first language respondents. The Alpha coefficients for the second language and first language groups are 0,86 and 0,84 respectively. The difference in reliability for the above groups can be regarded as small. The results of the item and reliability analysis suggest that the construct is comparable for second and first language respondents.

Table 3
Item analysis of the LCI autonomy scale for first and second language respondents

	First language respondents (N=332)			Second language respondents (N=286)		
	Item total Correlation	Alpha if Item deleted	Item Reliability	Item total Correlation	Aapha if Item deleted	Item Reliability
AI1	0,4165	0,8653	0,5821	0,1720	0,7826	0,2966
AI2	0,1873	0,8709	0,2751	0,2286	0,7800	0,3252
AI3	0,3847	0,8661	0,4999	0,2766	0,7781	0,4902
AI4	0,3478	0,8669	0,3743	0,4048	0,7743	0,5199
AI11	0,4151	0,8653	0,5949	0,2635	0,7789	0,5144
AI13	0,5152	0,8642	0,5120	0,3092	0,7774	0,4004
AI14	0,4244	0,8652	0,5549	0,3241	0,7760	0,5622
AI15	0,3986	0,8658	0,6117	0,1124	0,7862	0,2198
AI16	0,2548	0,8702	0,4119	0,0820	0,7895	0,1841
AI17	0,3151	0,8677	0,4312	0,1854	0,7822	0,3349
AI21	0,2852	0,8683	0,3852	0,0848	0,7864	0,1470
AI22	0,4279	0,8652	0,5151	0,3363	0,7762	0,4710
AI23	0,2811	0,8685	0,3936	0,2604	0,7788	0,4475
AI24	0,4577	0,8644	0,6303	0,3346	0,7755	0,6014
AI25	0,2663	0,8686	0,3400	0,1955	0,7815	0,3292
AI28	0,2768	0,8686	0,3880	0,2866	0,7777	0,5323
AI29	0,3082	0,8678	0,4082	0,2650	0,7786	0,4229
AI30	0,4250	0,8651	0,6617	0,4132	0,7720	0,7302
AI39	0,3280	0,8676	0,4930	0,0595	0,7880	0,1097
AI44	0,4652	0,8646	0,5280	0,3701	0,7745	0,5737
AI46	0,4876	0,8638	0,6225	0,4232	0,7720	0,6899
AI62	0,1902	0,8706	0,2647	0,3275	0,7760	0,5326
AI64	0,2628	0,8686	0,3150	0,1443	0,7839	0,2528
AI66	0,4890	0,8645	0,5023	0,4231	0,7728	0,6203
AI67	0,4594	0,8651	0,4677	0,4621	0,7714	0,6664
AI68	0,4557	0,8647	0,5470	0,5133	0,7686	0,8110
AI70	0,5372	0,8623	0,7707	0,3650	0,7743	0,6127
AI71	0,3719	0,8665	0,5619	0,1268	0,7852	0,2391
AI73	0,4346	0,8649	0,6158	0,1489	0,7839	0,2691
AI74	0,4809	0,8642	0,5782	0,3958	0,7732	0,6435
AI78	0,2586	0,8687	0,3184	0,0918	0,7872	0,1803
AI81	0,4519	0,8646	0,5777	0,4453	0,7718	0,6620
AI82	0,6087	0,8614	0,7468	0,4324	0,7722	0,6565
AI83	0,4356	0,8652	0,5039	0,4831	0,7698	0,7649

Scale reliability: First language group: 0,86
Second language group: 0,78

Table 4
Item analysis of the LCI internal locus of control for first and second language respondents

	First language respondents (N=329)			Second language respondents (N=306)		
	Item total Correlation	Alpha if Item deleted	Item Reliability	Item total Correlation	Alpha if Item deleted	Item Reliability
II6	0,4051	0,8403	0,4461	0,4841	0,8528	0,7729
II7	0,3970	0,8407	0,3914	0,4023	0,8552	0,6011
II8	0,3038	0,8438	0,3689	0,4048	0,8551	0,6659
II10	0,3791	0,8417	0,3014	0,4902	0,8531	0,6881
II18	0,4040	0,8406	0,3826	0,3262	0,8572	0,4729
II19	0,4685	0,8394	0,3858	0,4230	0,8551	0,5276
II26	0,2607	0,8452	0,3111	0,2321	0,8603	0,3936
II27	0,3690	0,8414	0,4083	0,4448	0,8541	0,6531
II31	0,4115	0,8402	0,1432	0,4200	0,8551	0,5399
II32	0,3577	0,8419	0,4300	0,2688	0,8599	0,5173
II33	0,3815	0,8410	0,4240	0,4090	0,8550	0,6373
II37	0,3520	0,8420	0,3858	0,4500	0,8539	0,6765
II40	0,4201	0,8397	0,5034	0,3336	0,8577	0,6346
II42	0,3218	0,8430	0,3574	0,4305	0,8544	0,6712
II48	0,2723	0,8450	0,3388	0,3119	0,8583	0,5845
II49	0,4769	0,8395	0,3698	0,4764	0,8538	0,6069
II54	0,2797	0,8446	0,3372	0,3352	0,8576	0,6364
II55	0,4455	0,8391	0,4671	0,4541	0,8537	0,7178
II59	0,3953	0,8406	0,4581	0,4146	0,8548	0,7399
II60	0,4202	0,8402	0,3981	0,4253	0,8545	0,6675
II61	0,3702	0,8415	0,4451	0,3476	0,8570	0,6219
II63	0,4410	0,8396	0,4110	0,5042	0,8529	0,6765
II69	0,3961	0,8406	0,4495	0,3519	0,8566	0,4905
II75	0,5804	0,8356	0,5550	0,4185	0,8548	0,6387
II76	0,3027	0,8443	0,4051	0,3946	0,8557	0,7841
II85	0,3478	0,8425	0,4616	0,4146	0,8548	0,7176
II86	0,3081	0,8440	0,4075	0,4071	0,8551	0,6300
II87	0,4251	0,8396	0,4782	0,4366	0,8542	0,6770

Scale reliability: First language group: 0,84
Second language group: 0,86

The results for the item analysis for the External Locus of Control scale for the first and second language respondents are set out in Table 5. There are three items (12% of the items) with an item total correlation value below 0,20 and relatively low item reliabilities for the second language group. All the item total correlations are acceptable for the first language respondents. The alpha coefficients for the second and first language respondents are 0,78 and 0,87 respectively. This can be regarded as a recognisable difference in reliabilities, especially considering the length of the scale and the equal standard deviations of the scale scores for the groups. The item and reliability analyses imply differences in the construct that is measured for both these groups.

The results of the factor analysis performed on the LCI indicate differences in the factor structures for second and first language respondents. The sample sizes for both the second and first language respondents were adequate, according to the Kaiser-Meyer-Olkin (KMO) measure of sample size (Kim and Mueller, 1978). The KMO-values were 0,883 and 0,888 respectively for the second and first language respondents. These values can be considered highly acceptable.

The postulated theoretical model of Schepers (1999) was used to determine the number of factors that were rotated. An oblique rotation method was used, as the LCI factors can be considered to be related (Schepers,1995). The quality of the factor solutions was evaluated using the level of interpretability and the simplicity of the structure obtained (DeVellis, 1991; Tinsley and Tinsley, 1987; Tabachnick and Fidell, 1989). Factor loadings of 0,30 and higher were considered acceptable (Tabachnick and Fidell, 1989). Small deviations from the 0,30 criterion were allowed to account for possible differences in sample homogeneity.

Table 5
Item analysis of the LCI internal locus of control for first and second language respondents

	First language respondents (N=325)			Second language respondents (N=289)		
	Item total Correlation	Alpha if Item deleted	Item Reliability	Item total Correlation	Alpha if Item deleted	Item Reliability
EI4	0,3177	0,8751	0,5437	0,2317	0,7827	0,4556
EI9	0,2487	0,8760	0,3177	0,1494	0,7866	0,2846
EI12	0,5153	0,8696	0,8810	0,2527	0,7813	0,4354
EI20	0,3429	0,8742	0,5168	0,1926	0,7845	0,3690
EI34	0,4147	0,8725	0,7252	0,1971	0,7844	0,3842
EI35	0,4643	0,8711	0,8838	0,3392	0,7770	0,6883
EI36	0,4768	0,8707	0,7880	0,3825	0,7751	0,6759
EI38	0,5627	0,8684	0,9117	0,3177	0,7782	0,5885
EI41	0,5140	0,8698	0,8171	0,2930	0,7794	0,5419
EI43	0,3960	0,8731	0,7024	0,2967	0,7793	0,6079
EI45	0,5490	0,8692	0,8059	0,4570	0,7704	0,9354
EI47	0,3297	0,8746	0,5213	0,2870	0,7799	0,6025
EI50	0,4442	0,8717	0,6504	0,3731	0,7758	0,6254
EI51	0,5133	0,8701	0,7323	0,2906	0,7795	0,4855
EI52	0,3112	0,8753	0,5244	0,3000	0,7793	0,6449
EI53	0,4148	0,8724	0,6861	0,4477	0,7712	0,8758
EI56	0,4611	0,8712	0,7475	0,3924	0,7744	0,7342
EI57	0,5111	0,8699	0,8104	0,2659	0,7811	0,5596
EI58	0,4070	0,8727	0,7128	0,3381	0,7770	0,6740
EI65	0,2294	0,8773	0,3761	0,3495	0,7768	0,5964
EI72	0,4403	0,8718	0,6696	0,3554	0,7764	0,6354
EI77	0,3274	0,8748	0,5421	0,2222	0,7838	0,4829
EI79	0,5793	0,8678	0,9850	0,3275	0,7778	0,5735
EI80	0,5573	0,8687	0,8802	0,4316	0,7724	0,8042
EI84	0,5663	0,8685	0,8781	0,3027	0,7789	0,5728
EI88	0,3833	0,8732	0,5710	0,3286	0,7777	0,5789

Scale reliability: First language group: 0,87
Second language group: 0,78

Figure 1 indicates that two significant factors can be identified for the second language respondents based on the results of the scree-test (Cattell, 1966) and Horn's (1965) criterion. A clear break can be observed on the scree-plot between Factors Two and Three. The eigenvalues of the random data set intersect the eigenvalues for the true data set between Factors Two and Three for the second language group, indicating two significant factors (Horn, 1965). The results reported in Table 6 indicate that the two significant factors explain 36,21% of the total variance. Kaiser's (1961) criterion clearly overestimates the number of true factors for the data set (Tabachnick and Fidell, 1989). According to Table 6. there are clear signs of over-factoring, as limited items loaded above 0,30 on Factor Three. The proposed three-model structure for the second language respondents is not well-defined or interpretable and does not resemble a simple structure. It is evident from the results that the three-factor structure proposed by Schepers (1999) did not hold for the second language respondents.

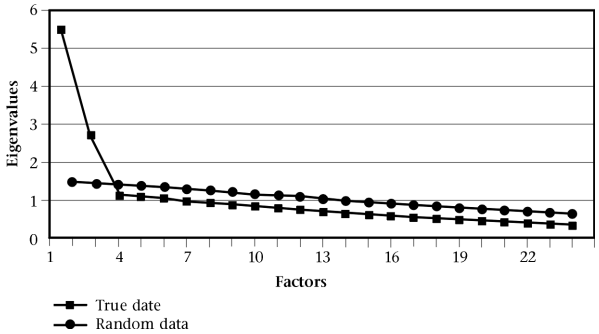

Figure 1: Scree plot second language

TABLE 6
FACTOR EIGEN VALUES AND VARIANCE EXPLAINED FOR FIRST AND SECOND LANGUAGE RESPONDENTS

Factor	Second language respondents (N=387)			Factor	First language respondents (N=357)		
	Total	% of variance	Cumula-tive %		total	% of variance	Cumula-tive %
1	5,536	24,068	24,068	1	6,753	29,361	29,361
2	2,794	12,146	36,214	2	2,927	12,728	42,089
3	1,139	4,954	41,167	3	1,865	8,107	50,196
4	1,075	4,676	45,843	4	1,009	4,387	54,583
5	1,029	4,473	50,316	5	0,928	4,034	58,618
6	0,995	4,152	54,468	6	0,838	3,644	62,262
7	0,887	3,856	58,324	7	0,790	3,436	65,698
8	0,850	3,696	62,020	8	0,718	3,122	68,820
9	0,788	3,424	65,444	9	0,687	2,986	71,806
10	0,777	3,380	68,825	10	0,654	2,841	74,647
11	0,741	3,220	72,045	11	0,623	2,709	77,356
12	0,709	3,083	75,127	12	0,578	2,514	79,870
13	0,686	2,984	78,111	13	0,570	2,477	82,347
14	0,627	2,726	80,837	14	0,530	2,303	84,650
15	0,604	2,624	83,461	15	0,504	2,193	86,843
16	0,589	2,560	86,022	16	0,475	2,064	88,908
17	0,545	2,371	88,392	17	0,459	1,995	90,902
18	0,521	2,265	90,658	18	0,441	1,916	92,818
19	0,479	2,082	92,740	19	0,402	1,746	94,564
20	0,465	2,023	94,763	20	0,367	1,594	96,158
21	0,422	1,835	96,598	21	0,335	1,457	97,615
22	0,409	1,780	98,378	22	0,296	1,287	98,901
23	0,373	1,622	100,000	23	0,253	1,099	100,00

Extraction method: Principal axis factoring Extraction method: Principal axis factoring

Figure 2 and Table 6 set out the results for the factor analyses for first language respondents. Kaiser's (1961) criterion, Horn's (1965) criterion and the scree-test indicate three significant factors for the above group. A clear break can be observed between Factors Three and Four, indicating three significant factors according to the scree-test. Kaiser's eigenvalue criterion indicates three distinct factors. The eigenvalues for the random data set intersect the eigenvalues for the true data set between the third and fourth factor, indicating a three-factor solution. The three factors explain up to 50% of the total variance for the data set (Table 6). A clear, well-defined, interpretable and simple factor structure can be observed in Table 6 for the first language respondents.

The congruence coefficient of Tucker (1951) was used to determine the level of congruence between factor structures as a measure of factor similarity and stability. According to Tabachnick and Fidell (1989), marker variables can be used to identify factors. It is clear from the results in Table 7 (the three-factor solution) that Factor One can be identified as the Internal Locus of Control scale for the second language respondents. Factor Two has been identified as the External Locus of Control scale for the second language respondents. Factor Three has retained certain elements of the Autonomy scale but is poorly defined for the second language respondents and can be considered an artefact. Factor One is clearly defined as the Autonomy scale for the first language respondents. The External Locus of Control scale is clearly visible as Factor Two for the first language respondents. The Internal Locus of Control scale has been identified as Factor Three for the first language respondents.

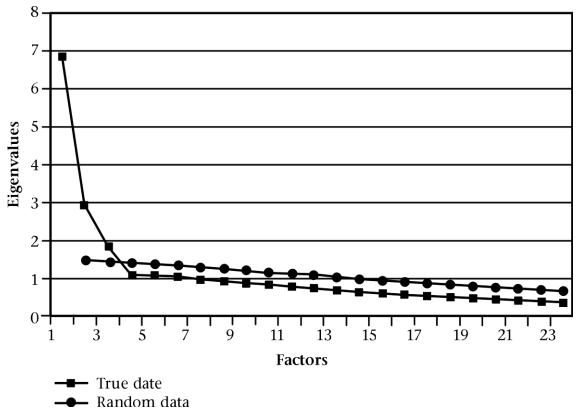

Figure 2: Scree plot first language

TABLE 7
ROTATED PATTERN MATRIX FOR SECOND AND FIRST LANGUAGE RESPONDENTS (THREE FACTOR SOLUTION)

	Second langiage respondents (N=387)				First language respondents (N=357)		
	Factor 1	Factor 2	Factor 3		Factor 1	Factor 2	Factor 3
AUT 1	0,129	-0,006	0,434	AUT 1	0,733	0,147	0,113
AUT 2	0,350	-0,178	0,225	AUT 2	0,637	-0,127	0,007
AUT 3	0,227	0,018	0,114	AUT 3	0,400	-0,152	-0,102
AUT 4	0,400	0,048	0,113	AUT 4	0,560	0,068	-0,041
AUT 5	0,016	-0,051	0,450	AUT 5	0,592	-0,196	0,012
AUT 6	0,173	0,138	0,524	AUT 6	0,436	-0,014	-0,296
AUT 7	0,244	-0,108	0,426	AUT 7	0,652	-0,142	-0,088
AUT 8	0,364	-0,147	0,098	AUT 8	0,440	0,150	-0,187
AUT 9	0,250	0,0008	0,454	AUT 9	0,587	-0,019	-0,118
INT 1	0,724	-0,146	-0,018	INT 1	-0,001	-0,113	-0,593
INT 2	0,452	0,137	0,176	INT 2	0,049	0,142	-0,532
INT 3	0,755	0,050	-0,095	INT 3	0,048	0,067	-0,651
INT 4	0,575	0,074	0,048	INT 4	-0,043	0,064	-0,642
INT 5	0,648	-0,042	-0,074	INT 5	0,039	-0,082	-0,630
INT 6	0,486	-0,024	0,219	INT 6	0,033	-0,184	-0,669
INT 7	0,476	0,034	0,131	INT 7	0,046	-0,001	-0,556
EXT 1	0,258	0,402	-0,174	EXT 1	-0,034	0,663	-0,060
EXT 2	0,055	0,493	-0,056	EXT 2	0,105	0,694	0,084
EXT 3	-0,071	0,596	-0,055	EXT 3	-0,072	0,675	0,082
EXT 4	-0,175	0,603	0,109	EXT 4	0,081	0,619	0,142
EXT 5	-0,005	0,575	0,179	EXT 5	-0,048	0,637	-0,084
EXT 6	-0,020	0,484	-0,042	EXT 6	-0,095	0,698	-0,117
EXT 7	0,031	0,519	-0,022	EXT 7	-0,220	0,619	-0,074

Extraction method: Principal axis factoring
Rotation method: Oblim with Kaiser normalization

Extraction method:Principal axis factoring
Rotation method: Oblim with Kaiser normalization

Table 8 sets out the Two-Factor solution. For both the second and first language respondents, Factor One has been identified as a combination of Autonomy and Internal Locus of Control and Factor Two as External Locus of Control.

The congruence coefficient (the three-factor solution) for the Internal Locus of Control scale in respect of the two groups is 0.91 and is considered congruent (Tucker, 1951). The congruence coefficient for the External Locus of Control scale in respect of the groups in question is 0.95. The External Locus of Control scale can be considered highly stable for the sample groups. The congruence coefficient for the Autonomy scale between groups is 0.83 and is not considered congruent. It is clear from the results that the External Locus of Control and Internal Locus of Control scales are stable for the groups included in the study. The congruence coefficient (two-factor solution) for the Internal Locus of Control scale in respect of the two groups is 0.99. and for the External Locus of Control, it is 0.93. This can be considered congruent.

The factor correlation matrix for the rotated factors clearly differs for the two groups, which signifies limited comparability in the rotated factor structures for the groups.

Table 8
Rotated pattern matrix for second and first language respondents (two-factor solution)

	Second langiage respondents (N=387)			First language respondents (N=357)	
	Factor 1	Factor 2		Factor 1	Factor 2
AUT 1	0,465	-0,051	AUT 1	0,336	-0,169
AUT 2	0,520	-0,174	AUT 2	0,376	-0,377
AUT 3	0,310	0,024	AUT 3	0,338	-0,293
AUT 4	0,476	0,072	AUT 4	0,384	-0,153
AUT 5	0,369	-0,107	AUT 5	0,342	-0,428
AUT 6	0,571	0,080	AUT 6	0,557	-0,142
AUT 7	0,572	-0,139	AUT 7	0,476	-0,384
AUT 8	0,432	-0,125	AUT 8	0,446	0,293
AUT 9	0,598	-0,035	AUT 9	0,472	-0,236
INT 1	0,680	-0,072	INT 1	0,559	-0,016
INT 2	0,575	0,157	INT 2	0,554	0,206
INT 3	0,642	0,131	INT 3	0,658	0,149
INT 4	0,590	0,122	INT 4	0,587	0,178
INT 5	0,616	0,020	INT 5	0,622	0,022
INT 6	0,645	-0,006	INT 6	0,644	-0,087
INT 7	0,563	0,062	INT 7	0,564	0,068
EXT 1	0,104	0,445	EXT 1	0,073	0,669
EXT 2	0,001	0,506	EXT 2	0,014	0,606
EXT 3	-0,123	0,597	EXT 3	-0,089	0,670
EXT 4	-0,091	0,564	EXT 4	-0,056	0,537
EXT 5	0,128	0,544	EXT 5	0,088	0,656
EXT 6	-0,061	0,489	EXT 6	0,093	0,741
EXT 7	0,052	0,526	EXT 7	-0,028	0,710
Extraction method: Principal axis factoring			Extraction method: Principal axis factoring		
Rotation method: Oblimin with Kaiser normalization			Rotation method: Oblimin with Kaiser normalization		

The inter-correlation matrix in Table 9 shows clear differences in the interrelationships between the LCI scales for the two groups. The significance of the differences in the correlation coefficients for the two groups was determined by calculating z-values (Kanji, 1993). The correlation between the Autonomy scale and the Internal Locus of Control scale is significantly higher (z = -5,02; p= 0,05) for the Second Language group than for the First Language group. The Autonomy scale appears not to be similar for the two groups in terms of its relation with the Internal Locus of Control scale. The External Locus of Control scale's correlation with the Autonomy scale differs significantly (z=5,28; p= 0,05) between the groups. The correlation between the Internal and External Locus of Control scales differ significantly (z=2,34; p= 0,05) for the groups. The correlation coefficients between the Internal and External Locus of Control scales are small for both groups, which verifies Schepers's (1995) conclusion that the Internal and External loci of control can be seen as separate constructs and not as bi-polar opposites.

Table 9
Scale intercorrelations matrix for first and second language respondents

	Autonomy	Internal	External
Autonomy	1,000	0,703	-0,083
Internal	0,465	1,000	0,043
External	-0,440	-0,212	1,000

Note: Correlations for the second language group are given in the upper triangular matrix and for the first language group in the lower triangular matrix

The structural equation models for the three hypothesized domains underlying the LCI for second language respondents (the three-factor solution) are given in Table 10 and Figure 3 respectively. The latent variables have been allowed to correlate with one another. With regard to the second language respondents, the NFI value is 0,823. The NNFI value is 0,903; the CFI value is 0,913; and the IFI value is 0,914. A value of 0.90 is generally considered to be an indicator of a model with with a good fit. for all the above-mentioned fit indices (Bentler, 1990; Bentler and Bonnett, 1980; Steiger, 1995).

With regard to the three-factor solution, the RMSEA value for second language respondents is 0,045. Hair et al (1995) consider RMSEA-values between 0,05 and 0,08 to be indicative of acceptable fit. Steiger (1995) considers RMSEA-values of less than 0.10 acceptable.

The chi-square (three-factor solution) was 401,856, based upon 227 df (p=0,01) for second language respondents. This chi-square measure for second language respondents is highly significant and indicates a poor model fit. However, given the current sample size, it would be incorrect to conclude poor fit based on the significance of the chi-square index. The chi-square/df ratio is 1,77 for second language respondents. Ratios between 2 and 5 can be interpreted as indicating a good fit (Kelloway, 1998).

The structural equation models for the two hypothesized domains underlying the LCI for second language respondents (the two-factor solution) are set out in Table 10 and Figure 4 respectively. The latent variables have been allowed to correlate with one another. I respect of the second language respondents, the NFI value is 0,804; the NNFI value is 0,882; the CFI value is 0,893 and the IFI value is 0,050.

With regard to the two-factor solution, the RMSEA value for second language respondents is 0,050. Hair et al (1995) consider RMSEA-values between 0,05 and 0,08 to be indicative of acceptable fit. Steiger (1995) considers RMSEA-values of less than 0,10 acceptable.

The chi-square (the two-factor solution) was 445,203 based upon 229 df (p=0,01) for second language respondents. This chi-square measure for second language respondents is highly significant and indicates a poor model fit. However, given the current

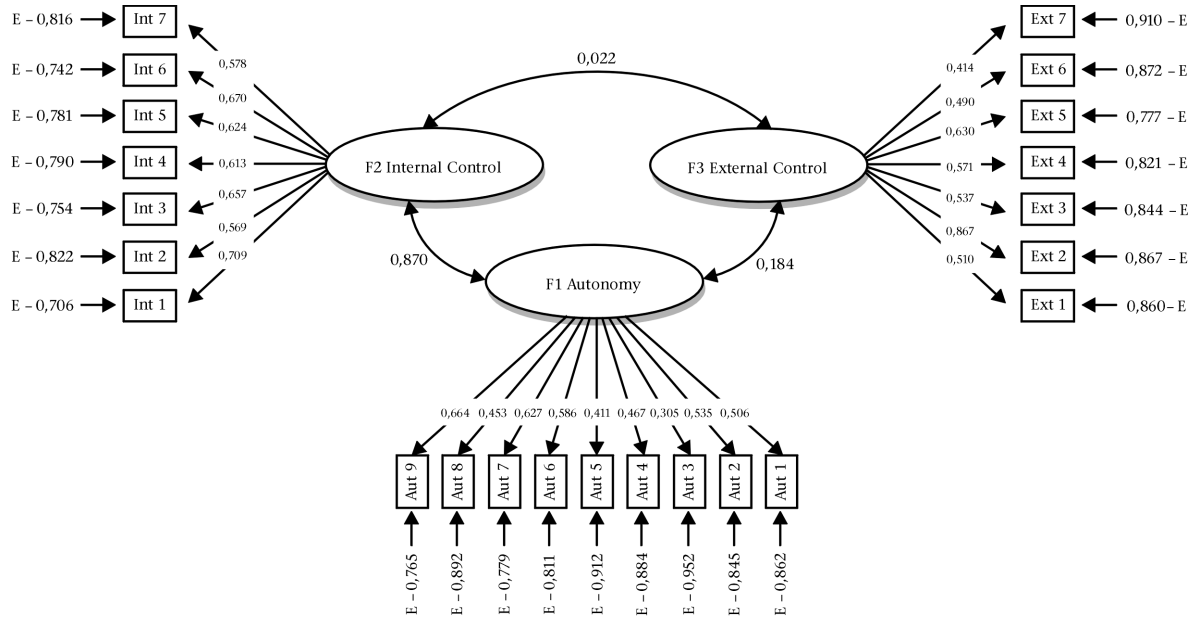

Figure 3: Standardised estimated parameters of the three-factor LCI model for the second language group

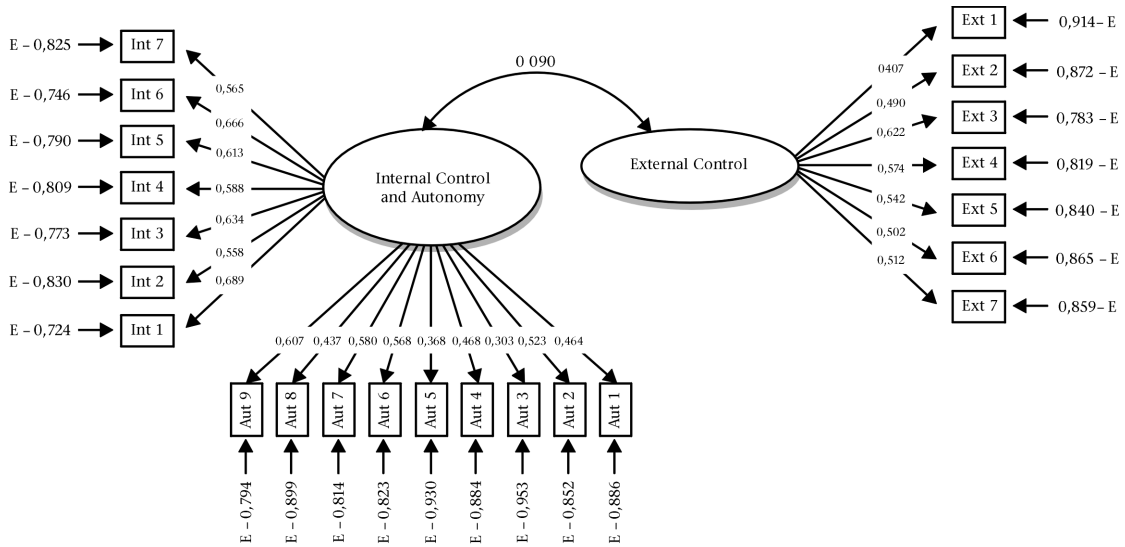

Figure 4: Standardised estimated parameters of the two-factor LCI model for the second language

sample size, it would be premature to conclude poor fit based on the significance of the chi-square index. The chi-square/df ratio is 1,944 for second language respondents.

TABLE 10
FIT INDICES FOR SECOND LANGUAGE RESPONDENTS

Second language respondents (N=387)	Three factor solution	Two-factor solution
CHI Square	401,856	445,203
(DF)	(227)	(229)
NFI	0,823	0,804
NNFI	0,903	0,882
CFI	0,913	0,893
IFI	0,914	0,894
RMSEA	0,045	0,050

Although some of the fit indices are marginally to recognizably lower than the accepted value for a good model fit, it can still be concluded that the two-factor model fits the data reasonably well. A matter of concern is the high correlation of 0,870 between the Autonomy and the Internal Locus of Control latent variables. Gorsuch (1997) indicates that confirmatory structural equations model analysis could fail to provide clear results when correlations between latent factors are too high. The high correlation between the Autonomy and the Internal Locus of Control latent variables suggests that the Autonomy and Internal Locus of Control constructs cannot necessarily be distinguished as separate constructs for the second language respondents. It can thus be concluded that the items that were constructed for the Autonomy and Internal Locus of Control scale overlap to such an extent that the scales cannot be considered factorially pure for the second language respondents. To test this conclusion, the aggregates for the Autonomy and Internal Locus of Control scales were grouped together as one of the factors in a two-factor model hypothesis, as illustrated in Figure 4.

Although some of the fit indices are lower than the accepted value for a good model fit, it can also be concluded that the

two-factor model fits the data reasonably well. It can further be concluded that the values for the two-factor model fit indices are very similar to the values of the three-factor model fit indices for the second language respondents. There thus appears to be very little distinction between the items for the Autonomy and Internal Locus of Control constructs for second language respondents and can they can be interpreted as a single latent construct.

Both the two-factor model and the three-factor model of the LCI were also tested for the first language respondents. Figure 5 presents the path diagram and fitted coefficients for the three-factor model. With regard to Table 11 for the first language respondents (the three factor solution), the NFI value is 0,819; the NNFI value is 0,868; the CFI value is 0,882; and the IFI value is 0,883. All of these values are close to 0,90, which may indicate that this is also a model with a relatively good fit. The RMSEA value for first language respondents was 0,065. The chi-square was 569,724, based also on 227 df (p=0,01) for first language respondents. The chi-square/df ratio is 2,50 for first language respondents. Ratios between 2 and 5 have been interpreted as indicating a good fit (Kelloway, 1998).

Figure 6 presents the path diagram and fitted coefficients for the two-factor model for first language respondents. With regard to the first language respondents (the two-factor model), the NFI value is 0,692; the NNFI value is 0,716; the CFI value is 0,774; and the IFI value is 0,746. None of these values are close to 0,90, which may indicate that this is not a model with a relatively good fit. The RMSEA value for first language respondents was 0,096. The chi-square was 969,247, based on 228 df (p=0,01) for first language respondents. The chi-square/df ratio was 4,25 for first language respondents. Ratios between 2 and 5 have been interpreted as indicating a good fit (Kelloway, 1998).

It is clear that the three-factor model fits the data considerably better than the two-factor model. These results suggest that the three-factor model is relatively more pure and has less error variance than the two-factor model for the first language respondents. There appears to be a clearer distinction between the Autonomy and Internal Locus of Control latent variables for first language respondents.

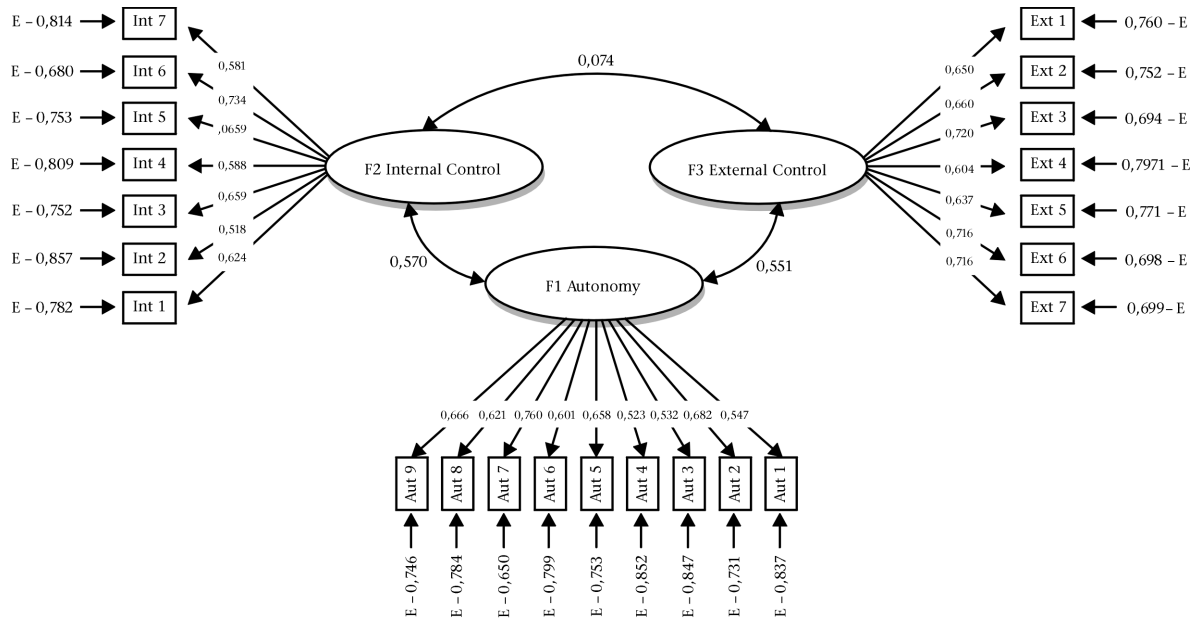

Figure 5: Standardised estimated parameters of the three-factor LCI model for first language respondents

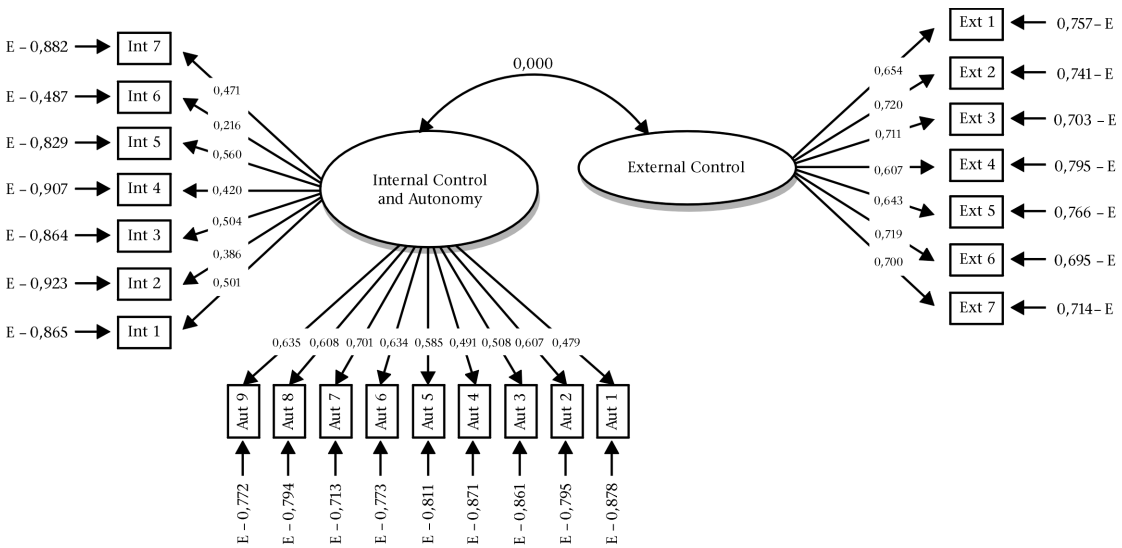

Figure 6: Standardised estimated parameters of the two-factor LCI model for the first language respondent

Table 11
Fit indices for first language respondents

First language respondents (N=387)	Three factor solution	Two-factor solution
CHI Square	569,724	969,247
(DF)	(227)	(228)
NFI	0,819	0,692
NNFI	0,868	0,716
CFI	0,882	0,774
IFI	0,883	0,746
RMSEA	0,065	0,096

DISCUSSION

Differences in the construct validity of the LCI for second and first language respondents included in this study are evident. The LCI, which was developed and standardized for respondents answering the questions in their first language (Afrikaans and English), appears to be less valid for second language respondents. The differences in mean values on the Autonomy and External Locus of Control scale scores are of little practical significance for the groups included in the study. The Internal Locus of Control scale could be of practical significance when comparisons between first and second language respondents are made and should be used with caution in such instances.

The reliability coefficients of the LCI for the second language and first language respondents both appear to be sufficient, but what can be questioned is the extent to which the scales can be equally interpreted for the groups in question. The Autonomy scale may be the greatest area of concern, because it is not equally valid for the second and first language respondents. The item analysis, reliability analysis and factor structures for the groups indicate clear differences in their response patterns for the scale. Interscale correlation analyses, factor loadings and confirmatory factor analyses indicate that second language respondents do not distinguised clearly between the Autonomy and Internal Locus of Control constructs. For first language respondents there is a clearer distinction between these constructs. The LCI appears to be factorially more pure for first language respondents than for second language respondents.

Although the External Locus of Control factor can be regarded as congruent for the groups included in the study, the reliability of the scale differs significantly for these groups. Comparisons between first and second language respondents regarding the External Locus of Control should thus be made with caution due to the differences in scale accuracy. The construct validity of the Internal Locus of Control scale appears not to differ substantially between second and first language respondents.

The study indicates that the LCI contains elements of bias in terms of construct validity for first and second language respondents. Various explanations can account for the differences between response patterns of the second and first language respondents, including linguistic proficiencies, attitudes, motivation, values and culture-specific differences (Owen and Taljaard, 1996). However, the low level of English language proficiency (Horne, 2001) is probably the best explanation for the differences in the construct validity of the LCI for the first and second language groups in the study.

The extent to which other factors play a role in the differences shown here in the construct validity of the LCI for second and first language respondents is not known. Further studies need to be undertaken to explain the observed differences in construct validity.

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