

MSP Research Note

CSQ Reliability, Validity and Norms

Introduction

This research note describes the reliability and validity of the CSQ. Evidence for the reliability and validity of is presented against some of the key the criteria in the EFPA Review Model for the Description and Evaluation of Psychological Tests (Bartram, 2002). The EFPA Review Model was produced to support and encourage the process of harmonising the reviewing of tests. It provides a standard set of criteria to assess the quality of tests. These cover the common areas of test review such as norms, reliability and validity.

Reliability

Internal consistency reliabilities

Table 1 shows the CSQ scale reliabilities. The internal consistency for the questionnaire as a whole is 0.92 and the median internal consistency for the CSQ scales is 0.78 which is which is defined as good by the EFPA review model (Bartram, 2002).

The CSQ scale sten score SEMs all in the range of 0.8-1.1. This means that there is a 68% likelihood that the person's true score on the scales will be about 1 sten either side of the observed score. The sten score SEM band around the CSQ total score is smaller (about .5) because the reliability is higher.

Table 1. Internal consistency reliabilities for CSQ (n = 4,162)

Scale	Alpha	Mean	SD	Raw score SEm	Sten score SEm
Original	0.75	36.45	5.65	2.82	0.98
Risk-Taking	0.79	31.52	6.23	2.86	0.95
Adaptable	0.70	37.48	5.27	2.89	1.07
Assertive	0.78	35.41	5.98	2.81	0.84
Achieving	0.78	37.70	6.15	2.88	0.78
Total Score	0.92	178.56	22.98	6.50	0.54

Construct Validity

Scale intercorrelations

Table 2 shows the intercorrelations of the CSQ scales. There are moderate to high correlations between the scales ranging from 0.26 to 0.70.

Table 2. Intercorrelations of CSQ scales (n = 4,162)

Scale	Risk-Taking	Adaptable	Assertive	Achieving
Original	0.65	0.70	0.57	0.51
Risk-Taking		0.56	0.55	0.26
Adaptable			0.49	0.49
Assertive				0.47

All correlations are significant at 0.01 level (2-tailed).

In order to determine how well a questionnaire differentiates between the different dimensions it is designed to measure, it is necessary to correct the correlations for unreliability. A correlation needs to be divided by the square root of the product of the two variables' reliability to determine what the correlation between the two variables would be if the variables' reliabilities were perfect. If two scales share less than 50% reliable variance, then we can be reasonably certain that they are independent.

Using 50% as a benchmark, it is apparent that there is a high degree of overlap between the Original, Risk-Taking and Adaptable scale pairs. The remaining scale pairs shows a reasonable degree of independence (Table 3).

Table 3. Percentage of common reliable variance for CSQ scales (n = 4,162)

Scale	Risk-Taking	Adaptable	Assertive	Achieving
Original	71.31	88.61	59.51	42.75
Risk-Taking		56.71	55.40	11.11
Adaptable			43.97	39.46
Assertive				36.31

Standard error of difference

The Standard Error of Difference (SEd) helps us determine the size of the gap that you need to see between a person's scores on any two scales before you can conclude that the difference is real. The SEd depends on the reliability of the scales – the higher the reliability the smaller the SEd is. If there are two full SEds between the scores on two scales, then there is a 95% likelihood that there is a real difference.

All the SEds in Table 4 are around 4 so a difference of around 8 or more in CSQ raw scores constitutes a real difference. This is equivalent to a difference of 3 Stens.

Table 4. Standard error of difference of CSQ scales (n = 4,162)

Scale	Risk-Taking	Adaptable	Assertive	Achieving
Original	4.02	4.04	3.98	4.03
Risk-Taking		4.07	4.01	4.06
Adaptable			4.03	4.08
Assertive				4.02

Factor analysis

Principal factors extraction with varimax rotation was performed on the CSQ scales on a sample of 2,118 respondents (see Table 5). The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.82, well above 0.6 required for a good factor analysis. The variables were on the whole well-defined by the factor solution. Community values were moderate to fairly high. One factor was extracted accounting for 67% of the variance indicating that creativity and problem solving style measured by the CSQ is a single construct.

Relationship to other measures

The Kirton Adaptation-Innovation Inventory (KAI) is a 32 item questionnaire which provides a measure of creative style (Kirton, 1994). The KAI places people on a single global dimension where one end of the dimension represents 'innovators' and the other end represents 'adaptors'. The KAI has 3 subscales: Originality, Efficiency and Conformity. The CSQ and the KAI were administered

to a sample of 126 managers and professionals studying for a MBA at Manchester Business School. The sample spanned 28 nationalities. Table 6 shows correlations between the KAI total score and subscales and the CSQ total score and subscales.

Table 5. Factor loadings and communalities for principal components extraction on CSQ scales (n = 2,118)

Scale	F1	Communality
Original	0.88	0.78
Risk-Taking	0.80	0.63
Adaptable	0.84	0.70
Assertive	0.78	0.61
Achieving	0.67	0.45

The CSQ total score and the KAI total score correlate significantly at 0.69 which is defined as good by the EFPA review model. The CSQ Original scale correlates significantly with the KAI Originality scale (0.67) and the CSQ Risk-Taking scale correlates significantly with the KAI Conformity Scale (0.58). The pattern of correlations confirms that CSQ measures important elements of creative style. Regression analysis indicated that the CSQ subscales account for about 65% of the variance in the KAI total score.

Table 6. Correlations between CSQ and the KAI (n = 126)

Scale	Originality	Efficiency	Conformity	KAI Total
Original	0.67*	0.11	0.35*	0.54*
Risk-Taking	0.59*	0.2	0.58*	0.63*
Adaptable	0.61*	0.02	0.37*	0.49*
Assertive	0.48*	0.05	0.33*	0.41*
Achieving	0.28*	-0.2	-0.03	0.07
Total Score	0.75*	0.17	0.56*	0.69*

* p <.01

Criterion-related validity

Table 7 shows the correlations between CSQ scale scores and job appraisal ratings. This is based on a sample of 1,960 respondents who completed the CSQ on the internet. Respondents were asked to report how their manager assessed their performance at their last performance appraisal using a 4-point scale (excellent, good, satisfactory, poor) and to assess their own performance. Combined ratings shown in the table are the sum of the manager's assessment and the test taker's self-assessment.

There are statistically significant correlations at 0.1-0.4 between job performance and all four factors. These correlations are consistent with those reported in the literature for personality assessment instruments. For example, Robertson (1997) notes that even with meta-analytic corrections, the upper limits for the validity of personality variables against overall work performance variables are in the range of 0.25 to 0.4.

Regression analysis was used to help understand the contribution of the different areas of emotional intelligence to job appraisal ratings. A standard multiple regression was performed between managerially and self-assessed job performance combined as the dependent variable and the CSQ scales as the independent variables.

Table 7 displays the correlations between the variables, the unstandardised regression coefficients (B), the semi-partial correlations (sr^2) and R, R^2 and adjusted R^2 . For the combined ratings, R for regression was significantly different from zero, $F(5, 1954) = 68.89, p < 0.001$. Two CSQ scales (Original and Achieving) contributed significantly to the prediction of job performance ratings ($sr^2 = 0.07$), and the five scales in combination contributed another 0.07 in shared variability. Altogether, 14% of the variability in job performance ratings was predicted by knowing scores on the five CSQ scores.

Table 7. Regression of CSQ scale scores on job performance ratings (n = 1,960)

	Combined Assessment (DV)	Original	Risk-Taking	Adaptable	Assertive	Achieving	B	Beta	Unique
Original	0.26						0.11	0.16	0.01**
Risk-Taking	0.12	0.68					-0.06	-0.09	0.00
Adaptable	0.24	0.70	0.58				0.02	0.04	0.00
Assertive	0.18	0.58	0.57	0.51			-0.02	-0.02	0.00
Achieving	0.36	0.51	0.30	0.50	0.48		0.24	0.30	0.06**
Intercept							4.63		
Mean	6.44	5.69	5.72	5.61	5.81	6.06		R^2	0.14 ^a
Standard deviation	1.34	1.97	2.08	1.96	1.80	1.64		Adjusted R^2	0.14
								R	0.38

** $P < 0.01$. ^aUnique variability = 0.07, shared variability = 0.07.

Norms

CSQ norms are based on a large international sample of 4,000 respondents who completed the questionnaire over the Internet between July 2002 and January 2004. A sample was created with equal numbers of men and women between the ages of 16 and 64. The mean age of the sample was 33 with a Standard Deviation of 11. The age distribution is shown in Figure 1. The norms are presented in Table 8.

Figure 1. Age distribution of CSQ international norms sample (n = 4,000)

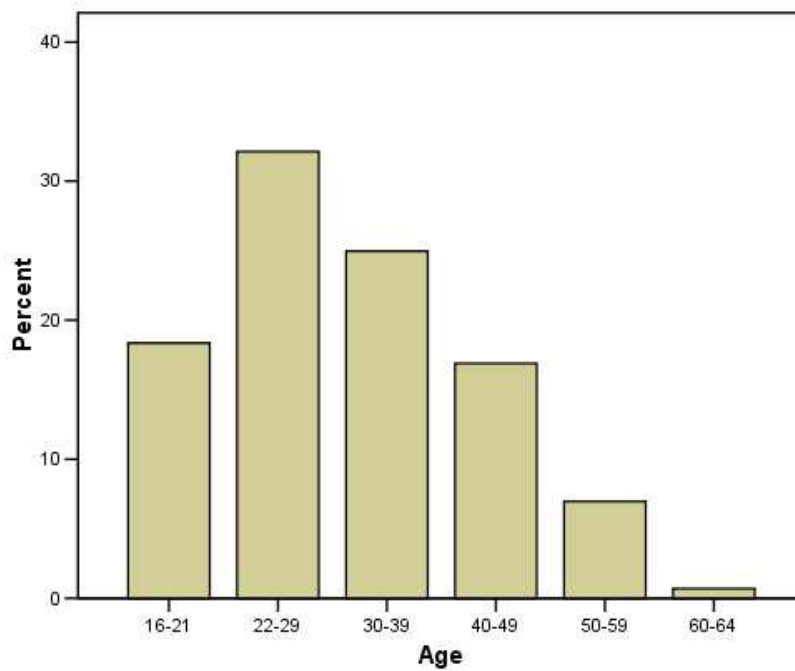


Table 8. CSQ general population norms (N = 4,000)

Scale	Stens										Scale	Mean	SD
	1	2	3	4	5	6	7	8	9	10			
Original	10-24	25-27	28-29	30-33	34-36	37-38	39-41	42-44	45-46	47-50	Original	36.45	5.65
Risk-Taking	10-18	19-21	22-24	25-27	28-30	31-34	35-37	38-40	41-43	44-50	Risk-Taking	31.52	6.23
Adaptable	10-25	26-28	29-31	32-34	35-37	38-39	40-42	43-44	45-46	47-50	Adaptable	37.48	5.27
Assertive	10-21	22-25	26-29	30-32	33-35	36-38	39-40	41-43	44-45	46-50	Assertive	35.41	5.98
Achieving	10-23	24-27	28-30	31-34	35-37	38-40	41-43	44-45	46-47	48-50	Achieving	37.70	6.15
Total Score	50-131	132-143	144-153	154-166	167-178	179-190	191-201	202-212	213-221	222-250	Total Score	178.56	22.98

References

Bartram, D. (2002). *EFPA Review Model for the Description and Evaluation of Psychological Tests: Notes for Reviewers*. www.efpa.be: European Federation of Psychologists' Associations.

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