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## STANDARDISATION OF BULL'S MENTAL SKILLS QUESTIONNAIRE IN SOUTH AFRICA AND THE UNITED KINGDOM

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### ABSTRACT

*The contemporary science of sport and exercise psychology requires the standardisation of mental skills questionnaires to facilitate accurate assessment of and intervention for individuals and groups in various health and sport related contexts. The study presents international research findings regarding the standardisation of a Mental Skills Scale with a sample of university students (N=420) from South Africa (n=211) and the United Kingdom (n=209) respectively. Although further international and national standardisation in both English and other languages is recommended, factor and reliability analyses indicated satisfactory validity and reliability of the current English version of the scale.*

**Key words:** Standardisation; Mental Skills Questionnaire; South Africa; United Kingdom; Sport and Exercise Psychology.

### INTRODUCTION

Mental skills (MS) are vital for contemporary life, health and well-being. Their accurate assessment is crucial for the development of health and sport in general and for the field of Sport and Exercise Psychology in particular. As holistic, overlapping, naturally occurring, daily utilised, learned abilities, MS are interrelated and form a unique, composite, inseparable whole (Bull *et al.*, 1996; Weinberg & Gould, 2011). They can be conceptually divided into distinct, but arbitrary, categories for research, teaching, assessment, training and intervention purposes. In various academic and professional fields, such as Sport and Exercise Psychology, MS are measured individually and/or collectively using psychometric instruments for some of which local and/or international norms have been established. Although a great amount of research has been undertaken specifically in sport and exercise, MS assessment and training are also equally applicable in other settings and performance domains. For example, Talbot-Honeck and Orlick (1998) measured and developed MS in top classical musicians to enhance performance, while Murphy and Orlick (2006) focused on MS application in the drama profession.

## PURPOSE OF THE STUDY

Bull's Mental Skills Questionnaire measures imagery ability, mental preparation (goal setting), self-confidence, anxiety and worry management, concentration ability, relaxation ability and motivation (Bull *et al.*, 1996). As it was based on Nelson and Hardy's (1990) empirically validated Sport-Related Skill Questionnaire (SPSQ), and originally intended for practical purposes, no United Kingdom (UK) norms have been developed for the scale. However, a psychometric evaluation of Bull's scale has been undertaken with Flemish sportspersons (Snauwaert, 2001), and Edwards and Steyn (2011) have established preliminary South African (SA) norms for the seven mental skills subscales. The present international collaborative research was aimed at more comprehensive standardisation of Bull's scale in both SA and the UK.

## METHODS

### Design

In this positivistic study, a descriptive, purposeful sample design was used and quantitative data analysis methods were employed.

### Ethical administrative procedures

Consent was obtained from the author of the questionnaire to undertake research on the scale and from the respective SA and UK Universities to conduct the research. The purpose of the study was explained to all participants. Consent was obtained from each participant. Confidentiality was guaranteed and participants were informed that they were free to withdraw from the study at any stage. Each participant completed the Bull's Mental Skills Questionnaire. All information was presented in a group format and kept confidential.

### Sample

For the purpose of standardising and establishing international norms for the Bull's Mental Skills Questionnaire, a large sample group was required. The purposive sample was also chosen on the basis of their potential understanding of the concept of mental skills. All participants were undergraduate students studying Psychology and/or Sport Science, the two main fields which comprise Sport and Exercise Psychology. The total sample consisted of 420 participants, with a mean age of  $20.81 \pm 4.12$  years and an age range from 18 to 47 years. There were 240 male and 180 female participants. Almost two thirds of the participants ( $n=272$ ) listed their home language as English, whilst 148 listed various other languages, mainly African languages, as their home language.

The SA sample's mean age and standard deviation was  $19.48 \pm 1.87$  years, while the UK sample's mean age and standard deviation was  $22.17 \pm 5.20$  years. The SA sample ( $n=211$ ) consisted of 87 males and 124 female participants, whereas the UK sample ( $n=209$ ) included 153 male and 56 female participants. In the SA sample, there were 107 English speakers and 104 other home language speakers such as Afrikaans, Sotho, Xhosa and Zulu, whereas in the UK sample there were 165 English speakers and 44 other home language speakers, such as Spanish, Portuguese, Arabic, Lithuanian and Danish. In all cases the participants (SA and

UK) were completing a university degree delivered in English. In order to access their chosen course of study the participants had previously demonstrated an advanced level of English comprehension.

### Bull's Mental Skills Questionnaire

The Bull's Mental Skills Questionnaire was developed in the UK to measure imagery ability (IA), mental preparation (MP), self-confidence (SC), anxiety and worry management (AWM), concentration ability (CA), relaxation ability (RA) and motivation (M) from which a total scale score is derived (Bull *et al.*, 1996). The questionnaire consists of 28 items and assesses participants along a 6-point Likert scale, requiring item responses ranging from „strongly agree“ to „strongly disagree“.

The scale was based on Nelson and Hardy's (1990) SPSQ, which consists of the following categories: imagery skill; mental preparation; self-efficacy; cognitive anxiety; concentration skill; relaxation skill; and motivation. The SPSQ was initially completed by 100 participants with all 7 subscales yielding Cronbach alpha values above 0.78. Bull's scale has been translated into Dutch, where it was assessed with 219 sportspersons and shown to have generally high Cronbach alpha levels of 0.80, 0.64, 0.62, 0.61, 0.59, 0.72 and 0.72 respectively for the 7 subscales (Snauwaert, 2001).

**TABLE 1: MEANS AND STANDARD DEVIATIONS OF PREVIOUS STUDIES IN SOUTH AFRICA USING BULL'S SCALE**

Study	N	Age	Stat	IA	MP	SC	AWM	CA	RA	M	Tot Sc
Danariah (2007)	60	17	M SD	18.60 -	20.20 -	18.90 -	16.10 -	17.40 -	18.40 -	20.50 -	130.10 -
Edwards (2007)	20	18	M SD	19.20 3.68	16.50 4.25	18.25 3.80	16.40 4.49	18.75 5.01	16.00 5.02	18.75 3.92	123.85 19.08
Edwards & Edwards (2007)	9	18	M SD	15.33 3.81	13.00 2.87	14.22 3.70	12.22 3.38	16.00 3.87	14.67 4.09	16.67 2.87	102.11 18.93
Edwards & Steyn (2011)	419	20	M SD	18.48 3.44	18.61 3.54	17.47 4.05	15.38 4.91	17.88 4.37	16.17 3.57	19.07 3.49	123.09 18.27
	Male 151	20	M SD	18.99 3.19	18.40 3.49	17.81 3.81	15.76 4.97	17.64 4.21	16.67 4.63	19.93 3.03	125.21 17.00
	Fem. 268	20	M SD	18.19 3.55	18.73 3.57	17.28 4.17	15.16 4.87	18.01 4.45	15.90 4.52	18.59 3.64	121.90 18.88
Kruger <i>et al.</i> (2013)	121	19	M SD	18.25 3.11	19.74 3.06	17.29 3.92	14.70 4.42	16.06 5.86	15.98 4.07	19.81 3.53	121.83 19.09

IA= Imagery Ability; MP= Mental Preparation; SC= Self-confidence; AWM= Anxiety & Worry Management; CA= Concentration Ability; RA= Relaxation Ability; M= Motivation

For Danariah's (2007) study, no data on standard deviations (SD) were reported. Age= Mean age

The scale has previously been used within the SA context (Danariah, 2007; Edwards, 2007; Edwards & Edwards, 2007; Edwards & Steyn, 2011; Kruger *et al.*, 2013). Table 1 provides a

summary of the mean ( $\pm$ SD) subscale and total scale scores for each of the samples in the aforementioned studies. Edwards and Steyn's (2011) study established preliminary norms with a sample of 419 SA university students. Analysis of variance indicated significant differences between males and females on imagery ability ( $F_{1, 419}=5.36$ ;  $p=0.02$ ) and motivation ( $F_{1, 419}=14.65$ ;  $p=0.00$ ), with the males scoring higher than the females on these scales. In terms of study mean comparisons, results were varied based on age and context. However, motivation was the highest scoring subscale in all of these studies, except for the study by Edwards (2007).

### **Data analysis**

The quantitative data were analysed using the computer based SPSS statistical software package with factor, reliability, multivariate and descriptive statistical analyses computed. Factor analysis was justified for the total sample, as well as the SA and UK sub-samples. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.85 for the total sample, 0.819 for the SA sample and 0.814 for the UK sample and in each case Bartlett's Test of Sphericity was significant ( $\alpha=0.00$ ). Because there had been no initial standardisation of the total scale, exploratory, rather than confirmatory, Principle Component Factor Analyses was indicated. Although Oblimin rotation was considered, Varimax rotation method for orthogonal factors was used as the correlation matrix indicated many correlations under 0.32 (Tabachnick & Fidell, 2007).

This was followed by Cronbach alpha Reliability Analyses, item analyses and multivariate analyses for subscale, age, sex and language differences. Initial descriptive Chi-square analyses comparing younger and older, male and female, English and other language category groups indicated significant demographic differences between the SA and UK samples. As these demographic differences, reported earlier, are obvious and their analysis is not essential to the study, this is simply mentioned in passing.

## **RESULTS AND DISCUSSION**

Results are presented in the abovementioned format, namely factor analyses followed by reliability, item and multivariate analyses.

### **Factor analyses**

Principal Component Factor Analysis for the total sample indicated 7 components accounting for 60.26% of the variance; for the SA sample indicated 8 components accounting for 64.65% of the variance; and for the UK sample indicated 7 components accounting for 61.83% of the variance.

From Table 2, it can be clearly observed that the factor structure of the total international sample exactly reflects the Bull's subscales of concentration ability (Factor 1), anxiety and worry management (Factor 2), mental preparation (Factor 3), relaxation ability (Factor 4), motivation (Factor 5), imagery ability (Factor 6) and self-confidence (Factor 7).

**TABLE 2: ROTATED COMPONENT MATRIX OF TOTAL SAMPLE**

Question	Factor						
	1	2	3	4	5	6	7
Q01						0.755	
Q02						0.748	
Q03						0.482	
Q04						0.645	
Q05			0.823				
Q06			0.812				
Q07			0.561				
Q08			0.641				
Q09							0.694
Q10							0.701
Q11							0.628
Q12							0.487
Q13		0.806					
Q14		0.807					
Q15		0.777					
Q16		0.735					
Q17	0.748						
Q18	0.760						
Q19	0.805						
Q20	0.760						
Q21				0.701			
Q22				0.458			
Q23				0.757			
Q24				0.713			
Q25					0.519		
Q26					0.644		
Q27					0.684		
Q28					0.764		

N= 420

**Reliability analyses**

Full scale, 28-item reliability analyses yielded satisfactory Cronbach alpha coefficients of 0.88 for the total sample, 0.89 for the SA sample and 0.88 for the UK sample. The reliability coefficients for the respective subscales are reported in Table 3.

**TABLE 3: RELIABILITY COEFFICIENTS FOR TOTAL, SOUTH AFRICAN AND UNITED KINGDOM SAMPLES**

<b>Items</b>	<b>Total sample (N=420)</b>	<b>SA sample (n=211)</b>	<b>UK sample (n=209)</b>
Imagery ability	0.70	0.81	0.44
Mental preparation	0.71	0.72	0.69
Self-confidence	0.75	0.70	0.80
Anxiety and worry management	0.64	0.61	0.66
Concentration ability	0.73	0.73	0.75
Relaxation ability	0.83	0.81	0.83
Motivation	0.83	0.78	0.84

### Item analyses

As can be observed from the rotated component matrix of Table 4, in the SA sample, clusters of factors preserved their original, integrated structure for Factor 1 (relaxation ability), Factor 2 anxiety and worry management, Factor 3 (concentration ability) and Factor 4 (mental preparation). Factor 5 contains 2 items from the motivation subscale Q27 (“I am good at motivating myself”) and Q28 (“I usually feel that I try my hardest”), which are combined with Q12 (“Throughout competitions I keep a positive attitude”) and Q7 (“I always analyse my performance after I complete my performance”). Thus, the scale factor of motivation appears to be associated with a positive attitude and performance analysis, which for this sample might be considered as motivating factors. Factor 6 retains 3 items from the original self-confidence scale, which are combined with Q25 (“At competitions I am usually psyched enough to compete well”). Factor 7 contains 3 of the items from the original imagery ability scale, which are combined with Q7 (“I always analyse my performance after I complete my performance”).

Thus, it seems that the SA sample may have perceived question 7, post-performance analysis, as both an imagery and motivating factor. This interpretation is supported by the additional Factor 8, which contains 2 of the items from the original imagery ability subscale, as well as 2 items from the original motivation subscale. The particular items, Q25 (“At competitions I am usually psyched enough to compete well”) and Q26 (“I really enjoy a tough competition”) may reflect both perceptions of the motivating power of imagery, as well as competitive, competition and/or toughness images and/or fantasies. It may reflect social constructions, and/or fantasies, discourses and valuing of tough, competitive, winning and/or macho culture. It may also reflect the influence of linguistic interpretation of the items by almost half of the SA sample, who had home languages other than English.

**TABLE 4: ROTATED COMPONENT MATRIX FOR SOUTH AFRICAN SAMPLE**

Question	Factor							
	1	2	3	4	5	6	7	8
Q01							0.789	
Q02							0.802	
Q03								0.657
Q04							0.376	0.645
Q05				0.864				
Q06				0.834				
Q07				0.391	0.484		0.302	
Q08				0.676				
Q09						0.752		
Q10						0.654		
Q11						0.655		
Q12					0.515			
Q13		0.789						
Q14		0.809						
Q15		0.693						
Q16		0.599						
Q17			0.660					
Q18			0.721					
Q19			0.778					
Q20			0.772					
Q21	0.693							
Q22	0.621							
Q23	0.769							
Q24	0.773							
Q25						0.347		0.412
Q26								0.598
Q27					0.702			
Q28					0.709			

From Table 5, it is clear that the factor structure of the UK sample reflected the Bull's subscales of concentration ability (Factor 1), motivation (Factor 2), anxiety and worry management (Factor 3), mental preparation (Factor 4), imagery ability (Factor 5), self-confidence (Factor 6) and relaxation ability (Factor 7), although in the latter case, only 3 items of Bull's scale were retained.

**TABLE 5: ROTATED COMPONENT MATRIX FOR UNITED KINGDOM SAMPLE**

Question	Factor						
	1	2	3	4	5	6	7
Q01					0.703		
Q02					0.727		
Q03					0.535		
Q04					0.642		
Q05				0.774			
Q06				0.791			
Q07				0.655			
Q08				0.613			
Q09						0.486	
Q10						0.639	
Q11						0.583	
Q12						0.626	
Q13			0.800				
Q14			0.788				
Q15			0.747				
Q16			0.798				
Q17	0.775						
Q18	0.795						
Q19	0.720						
Q20	0.684						
Q21							0.748
Q22							
Q23							0.749
Q24							0.604
Q25		0.647					0.269
Q26		0.666					
Q27		0.701					
Q28		0.758					

It is usual convention not to accept items which have factor loadings of less than 0.30. Item Q25 (“At competitions I am usually psyched enough to compete well”), was the only other factor item that approximates a 0.30 loading. This indicates a slight merging of the motivation and relaxation ability factors in this sample, which is understandable and reasonable in terms of the particular wording of Q25.



### Means and standard deviations

Descriptive demographic aspects of the present sample have been reported earlier. Means and standard deviations (SD) for the various subscales are reported in Table 6.

**TABLE 6: MEANS AND STANDARD DEVIATIONS FOR SUBSCALES**

Sample	N	Stat	IA	MP	SC	AWM	CA	RA	M
Total	420	M	18.65	17.67	16.81	17.10	16.95	15.81	19.29
		SD	3.42	3.62	3.87	4.84	4.91	3.74	3.30
SA	211	M	18.73	18.04	17.23	18.42	15.69	16.03	19.12
		SD	3.49	3.46	3.96	4.25	4.90	4.42	3.27
UK	209	M	18.57	17.31	16.38	15.78	18.23	15.58	19.46
		SD	3.36	3.75	3.75	5.05	4.58	2.89	3.33

IA= Imagery Ability; MP= Mental Preparation; SC= Self-confidence; AWM= Anxiety & Worry Management; CA= Concentration Ability; RA= Relaxation Ability; M= Motivation

Multivariate analysis for the different university samples revealed significant differences for mental preparation ( $F=4.38$ ;  $p<0.037$ ;  $\eta^2=0.010$ ), self-confidence ( $F=5.15$ ;  $p<0.024$ ;  $\eta^2=0.012$ ), anxiety and worry management ( $F=33.79$ ;  $p<0.00$ ;  $\eta^2=0.075$ ), and concentration ability ( $F=30.14$ ;  $p<0.00$ ;  $\eta^2=0.067$ ). In each case the direction of these differences can be noted above, with the SA sample scoring higher for mental preparation, self-confidence, and anxiety and worry management, and the UK sample scoring higher for concentration. However, effect sizes are small in all comparisons.

Multivariate analysis for age, sex and language, revealed very few significant findings, with small effect sizes for all comparisons except for older students scoring significantly higher for anxiety and worry management than younger students ( $F=1.79$ ;  $p<0.013$ ;  $\eta^2=0.098$ ). Women scored significantly higher than men for mental preparation ( $F=4.12$ ;  $p<0.043$ ;  $\eta^2=0.010$ ), while men scored significantly higher for motivation ( $F=10.64$ ;  $p<0.001$ ;  $\eta^2=0.025$ ). There were no significant differences for language influences on the respective subscales.

### CONCLUSION AND RECOMMENDATIONS

This study is the first standardisation of the English version of the Bull's Mental Skills Questionnaire, which was found to exactly retain its original hypothesised factor structure with an international large sample of university students from two countries, SA and the UK. This is a strong endorsement of this version of the scale, as were the very satisfactory reliability analyses for the total international sample, as well as the two national samples. This provides a general argument for the validity and reliability of the English version of the scale for future international research. There is some indication from the two countries that the findings can be generalised. The provisional recommendation is that the scale be retained in its current form for future international research unless other studies provide contrary evidence.

Obviously, further research and standardisation of the scale is needed in both SA and the UK for the validity and reliability to be asserted with any degree of confidence. In particular, further psychometric evaluation and standardisation is warranted for samples with home languages other than English. Although the scale has value with English-speaking populations in other countries, diverse languages and cultures inevitably present alternative interpretations of items. As was the case in the standardisation of the scale for Flemish sportspersons, research developing other language versions of the scale seems required, relevant and recommended.

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