A PROTOCOL AND COMPARATIVE NORMS FOR THE IDENTIFICATION AND SELECTION OF TALENT AMONG ELITE AGE-GROUP RUGBY PLAYERS IN SOUTH AFRICA

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ABSTRACT

In South Africa and around the world, sporting bodies concern themselves with the identification and development of potentially successful sports players. Rugby union is one of the most prominent sport types in which South Africa has achieved great success, both historically and currently. There have been a number of studies on talent identification in rugby and this study has attempted to further contribute to that body of knowledge. Therefore, the aim of this study was to develop reviewed and alternative sport and position-specific testing protocols as well as comparative results for identification and selection in elite age-group rugby union. The sample group consisted of the 2008 Blue Bulls Vodacom Cup and U/21 *rugby squad (n=24), the 2008 South African* U/21 *rugby squad (n=26) and the 2008* TUKS *Rugby Academy squad (n=22). These squads were divided into the positional groupings of tight forwards, loose forwards and backs. New and modified talent and ability tests were successfully established, e.g. 3 x 5 x 22 m anaerobic capacity test, the S-test (passing accuracy) and the kick for distance and accuracy test. These tests were modified from pre-existing tests that have long been the mainstay of talent identification in rugby union in South Africa and made up part of the broader modified protocol consisting of anthropometric, physical-motor and rugby-specific skills. Furthermore, a sport-vision aspect to testing was also successfully incorporated. It can, therefore, be concluded that this study makes a meaningful contribution towards the identification and selection of those currently involved or capable of future success in elite age-group rugby union through the provision of a robust test protocol and comparative results that can serve as an alternative identification and selection tool.*

Key words: Rugby, sustainability, successful, identification, development, selection, anthropometric, physical-motor, rugby-specific, sport-vision

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INTRODUCTION

While the true origins of rugby union remain unclear (Smith, 2006), the first official international rugby match can be traced back to the game between Scotland and England in 1871 (Smith, 2006; Quarrie & Hopkins, 2007). Since this landmark match, rugby union has undergone change. From the player number reductions of 1875 (Evert, 2006; Smith, 2006) to the law modifications of more recent years (Evert, 2006; Quarrie & Hopkins, 2007), rugby union is undoubtedly attempting to make the game more attractive to a larger target market (Evert, 2006). South Africa's own entry to the international rugby arena occurred in 1891 in the series against the British tourists (Evert, 2006; Smit, 2007). From that time onwards, South Africa has been regarded as one of the strongest rugby playing nations in the world (Evert, 2006; Unknown Author, 2007) and is currently the reigning IRB rugby world champion.

South Africa is understandably concerned with maintaining and sustaining this success, and has been for some time now, not just in rugby but most sports. As far back as the early 1990s and coinciding with South Africa's readmission to world sport, the study of Du Randt (1992) provided ground-breaking findings and recommendations pertaining to talent identification and development in sport worldwide and made further recommendations for the unique South African context. Subsequent to this publication, the pioneering research of Pienaar and Spamer (1995) in Pienaar and Spamer (1998), Pienaar and Spamer (1996a, 1996b, 1998), Pienaar *et al.* (1998, 2000) and Hare (1999) in the same field of talent identification and development, but focused primarily on rugby union, has made valuable contributions to furthering the knowledge base and know-how needed to successfully pursue this goal of sustainability of success.

These studies utilised a multivariate approach to talent identification. This approach was adopted, since successful participation in rugby requires sufficient ability in various components. Van Gent and Spamer (2005) list these components as being those of rugby-specific, anthropometric and physical-motor requirements. In the more recent studies of Spamer and Winsley (2003a; 2003b), Van Gent (2003), Van Gent and Spamer (2005), Plotz and Spamer (2006) and Spamer and De la Port (2006) on rugby union, the continued successful implementation of this approach is noted. With this background as guidance, the purpose of this study was to develop a measuring or analysis tool (with associated norms for future comparison) that can be implemented to both identify and select those age-group players who possess current ability or the potential to be promoted to higher honours. Another purpose was to make this tool as sport- and position-specific as possible.

METHODOLOGY

Following an exhaustive literature review in conjunction with an interviewing process incorporating successful national and international level coaches and conditioning experts, a protocol was developed for the purposes of testing. The sample group consisted of the 2008 Blue Bulls Vodacom Cup and U/21 rugby squad (n=24), the 2008 South African U/21 rugby squad (n=26), and the 2008 TUKS Rugby Academy squad (n=22). The ages of the players ranged between 18 and 25 years old.

These player squads were divided into the positional groupings of tight forwards, loose forwards and backs. The precedent for this division of playing positions was created by Van Gent (2003) and Van Gent and Spamer (2005) who initially assigned the players to the positions of tight forwards (props, hookers, locks), loose forwards (flankers and eighth men), halves (scrum-halves and fly-halves) and backline players (centres, wings and fullbacks). For this present study the decision was made to preserve the tight and loose forward groupings as in the previous studies, but to incorporate the halves and backline players into one global grouping as noted earlier. The primary reason for this was the elite nature, and therefore the associated scarcity, of the sample group. This necessitated maintaining larger groupings for more meaningful norms and scores.

The final testing protocol consisted of the following:

(i) Anthropometric measurements that included: 1) body mass and body height/stature (Norton *et al.,* 1996; Van Gent, 2003) and 2) body fat percentage utilising the four-site system of skinfold measurement (Durnin & Womersley, 1974; Hazeldine & McNab, 1991).

(ii) Physical-motor measurements that incorporated 1) vertical jump (Harman *et al.,* 2000); 2) 10/40 m dash (Hazeldine & McNab, 1991); 3) T-test (Harman *et al.,* 2000) and 4) the 3 x 5 x 22 m anaerobic capacity test (self-devised and modified from the 10 x 22 m shuttle run test of Krüger *et al.,* 2001).

(iii) Rugby-specific, self-devised tests consisting of 1) the S-test (self-devised and modified from the (a) pass for accuracy over 4 m and (b) the catching while moving forward tests of Pienaar and Spamer (1995) in Pienaar and Spamer, 1998) and 2) the combination kick for distance and accuracy test (self-devised and modified from the kick for distance test of Pienaar and Spamer (1995) in Pienaar and Spamer, 1998).

(iv) Finally, sport-vision tests consisting of 1) the Accuvision1000 30 accurate lights in total time test (Venter & Maré, 2005; Du Toit *et al.,* 2006).

Descriptive statistics (mean, standard deviation, minimum and maximum scores for each measurement per group) were determined for the group. Inferential statistical analysis (Kruskal-Wallis one-way analysis of variance) was also performed on the data, where possible.

RESULTS AND DISCUSSION

The results of each component are firstly presented in table form, followed by a brief discussion of these tabulated findings.

A. Anthropometric component

From the results of table 1 the following can be said:

There were statistically significant differences ($p<0.05$) between the height (cm) and body mass (kg) of the various positions. In this regard the tight forwards were heavier and taller than both the loose forwards and the backs. The loose forwards had the lowest skin fold total score, with the tight forwards' score in this category significantly higher ($p<0.05$) than the other two positions; the body fat percentage score of tight forwards was statistically significantly higher ($p<0.05$) than the other positions. Here the loose forwards had the lowest body fat percentage. In summary of the findings from the anthropometric component of this study, the tight forwards scored higher than the loose forwards and the backs in the body mass and body stature measures, respectively. The loose forwards scored higher than backs and tight forwards in the body fat percentage (lowest percentage) score.

Table-1
Descriptive statistics per group on anthropometric components

Grouped Positions		n	Mean	Std Dev
Tight forwards	Age (years)	21	19.71	0.78
	Height (cm)	21	184.96	8.29
	Body mass (kg)	21	103.42	9.90
	Biceps SF (mm)	21	6.12	1.72
	Body fat % vs skinfold thickness	21	19.44	4.63
	Valid n (listwise)	21		
Loose forwards	Age (years)	27	20.07	0.73
	Height (cm)	27	182.55	6.14
	Body mass (kg)	27	92.88	8.12
	Body fat % vs skinfold thickness	27	16.08	3.01
	Valid n (listwise)	27		
Backs	Age (years)	30	20.17	1.86
	Height (cm)	30	177.77	6.35
	Body mass (kg)	30	85.82	9.77
	Body fat % vs skinfold thickness	30	16.61	3.89
	Valid n (listwise)	30		

B. Physical-motor component

From tables 2 and 3, the results can be interpreted as follows:

Although the tight forwards presented with higher scores on the vertical jump measure (cm) than the other two positions, the differences found between these positions were not statistically significant. As a possible interpretation of this finding, it could perhaps be surmised that the tight forwards need greater amounts of power and strength in the tight phases (scrums) or even line-outs than do the other positions.

For the 10 m dash (sec) scores (lowest score) a statistically significant difference ($p<0.05$) was found between the positions. The backs and loose forwards presented with significantly lower scores than tight forwards. For the 40 m dash (sec) scores (lowest score) the backs were once again found to have the lowest score, followed by loose forwards. In this case, a statistically significant difference was encountered at the 5% level of significance. The tight forwards had the highest score here as well, indicating that they completed the 40 m dash at a much slower pace than the other positions. In the T-test (sec), the time taken by tight forwards was significantly higher ($p<0.05$) than the other two positions. The loose forwards presented with the best time in this measure, followed by the backs.

Table-2
Descriptive statistics per group on physical-motor variables (best effort)

Grouped Positions		n	Mean	Std Dev
Tight forwards	Vertical jump difference between reach distance and best attempt (cm)	21	53.71	7.02
	Valid n (listwise)	21		
Loose forwards	Vertical jump difference between reach distance and best attempt (cm)	27	53.63	6.84
	Valid n (listwise)	27		
Backs	Vertical jump difference between reach distance and best attempt (cm)	30	52.57	5.31
	Valid n (listwise)	30		
Tight forwards	10 m dash sec lowest score (sec)	21	2.161	0.177
	40 m dash sec lowest score (sec)	21	5.944	0.358
	T-test lowest score (sec)	21	11.437	0.890
	Valid n (listwise)	21		
Loose forwards	10 m dash sec lowest score (sec)	27	2.012	0.196
	40 m dash sec lowest score (sec)	27	5.586	0.353
	T-test lowest score (sec)	27	10.655	0.757
	Valid n (listwise)	27		
Backs	10 m dash sec lowest score (sec)	30	2.006	0.173
	40 m dash sec lowest score (sec)	30	5.542	0.320
	T-test lowest score (sec)	30	10.745	0.919
	Valid n (listwise)	30		

In the 3 x 5 x 22 m anaerobic capacity test, no statistically significant differences were found between the scores of the three positional groupings for the first anaerobic capacity attempt. For the second and last attempts, significant differences ($p<0.05$) were found. In this regard, the scores of the tight forwards in the second and third attempts were significantly higher than those of the other two positions. While the anaerobic capacity of the loose forwards and backs remained fairly stable over all three measurements, in this measure it is the loose forwards who outperformed the backs. A possible explanation for the superiority of the loose forwards in anaerobic capacity could be the relative workload that they produce to get through the game and to fulfil their game-based tasks successfully.

Table-3
Descriptive statistics per group on 3 x 5 x 22 m anaerobic capacity test

Grouped Positions		n	Mean	Std Dev
Tight forwards	5 x 22 m set 1 (sec)	21	22.119	0.914
	5 x 22 m set 2 (sec)	21	23.869	1.499
	5 x 22 m set 3 (sec)	21	24.459	1.953
	Valid n (listwise)	21		
Loose forwards	5 x 22 m set 1 (sec)	27	21.533	1.015
	5 x 22 m set 2 (sec)	27	22.448	1.226
	5 x 22 m set 3 (sec)	27	22.543	1.305
	Valid n (listwise)	27		
Backs	5 x 22 m set 1 (sec)	30	21.744	1.259
	5 x 22 m set 2 (sec)	30	22.837	1.699
	5 x 22 m set 3 (sec)	30	22.826	1.450
	Valid n (listwise)	30		

C. Sport-vision component

Table 4 presents the results of the Accuvision1000 30 accurate lights in total time test (sec). Here, no statistically significant differences between positions were found. The loose forwards scored the best times (shorter time) in this measure, followed by the backs, with the tight forwards coming last.

Table-4
Descriptive statistics per group on Accuvision1000 30 accurate lights in total time test

Grouped Positions		n	Mean	Std Dev
Tight forwards	30 lights test (sec)	21	24.333	3.331
	Valid n (listwise)	21		
Loose forwards	30 lights test (sec)	27	21.778	3.474
	Valid n (listwise)	27		
Backs	30 lights test (sec)	30	22.778	4.387
	Valid n (listwise)	30		

D. Rugby-specific skill component

1. S-test

This test was self-devised and modified by Pienaar and Spamer (1998) from the pass for accuracy over 4 m and the catching while moving forward tests from Pienaar and Spamer (1995). The final version of this test includes two main aspects for successful completion, namely accuracy and time taken to complete the test. Therefore, a combined score was determined to get a total score for the S-test. This was necessitated by two main drivers:

a. Some test participants could score 0 points (each accurate pass = 5 points – there are two passes, one left and one right) but take less time to complete the test course. By only considering the time taken to complete the test, the overall impression of a test participant's relative or actual performance could possibly be inaccurate. A possible scenario is that 0 points can be scored in a shorter period of time as opposed to 10 points over a longer time frame.

b. In this measure, a higher passing score is associated with better performance, but since there is also a time factor involved in this test, as mentioned before, possible discrepancies could arise as to the true reflection of the scores obtained in this test.

To address this potential problem the following solution was devised:

The mean score in terms of time taken to complete the test was used to categorise performance into two groups. The first category or group 1 consisted of those participants who completed the test course in equal or less time than the average time (sec) taken by that specific grouped position. 2 "multiplier" points were assigned to these participants. The second category or group 2 consisted of those subjects who took longer than the average time (sec) to complete the test course for that specific grouped position. These participants were assigned only 1 "multiplier" point. A total and final score for this S-test was then calculated by multiplying the points scored for passing accuracy (best attempt) (this could be 0, 5 or 10 points) by the "multiplier" points (1 or 2) that the participant received for task performance relative to the mean time, per positional grouping. Therefore, this final score for the S-test was a computed score that took into account both the time taken to perform this task as well as the accuracy of the subject in completing it.

Following the presentation of the tabulated scores in tables 5 to 8, a discussion of the results, along with a full explanation of the scoring system and associated implications for this test per position, is provided.

Table-5
Mean scores on recoded time taken to complete the S-test per positional grouping

Grouped Positions		S-test 1 (Sec)	S-test 2 (Sec)
Tight forwards	n	Valid	21
	Mean	7.630	7.604
	Median	7.585	7.630
	Mode	6.91(a)	7.66
Loose forwards	n	Valid	27
	Mean	7.299	7.002
	Median	7.230	6.980
	Mode	6.27(a)	5.65(a)
Backs	n	Valid	30
	Mean	7.709	7.339
	Median	7.680	7.395
	Mode	6.68(a)	7.50

(a) Multiple modes exist. The smallest value is shown.

Table-6
Frequencies for tight forwards' best attempt on S-test computed total

	Score Obtained	Frequency	Per Cent	Valid Per Cent	Cumulative Per Cent
Valid	.00	3	13.3	14.3	14.3
	5.00	6	26.7	28.6	42.9
	10.00	9	46.7	50.0	92.9
	20.00	3	6.7	7.1	100.0
	Total	21	93.3	100.0	
Total	15	100.0			

Table-7
Frequencies for loose forwards' best attempt on S-test computed total

	Score Obtained	Frequency	Per Cent	Valid Per Cent	Cumulative Per Cent
Valid	0.00	2	5.6	5.9	5.9
	5.00	4	11.1	11.8	17.6
	10.00	15	55.6	58.8	76.5
	20.00	6	22.2	23.5	100.0
	Total	27	94.4	100.0	
Total	18	100.0			

Table-8
Frequencies for backs' best attempt on S-test computed total

	Score Obtained	Frequency	Per Cent	Valid Per Cent	Cumulative Per Cent
Valid	0.00	2	5.3	5.6	5.6
	5.00	2	5.3	5.6	11.1
	10.00	18	57.9	61.1	72.2
	20.00	8	26.3	27.8	100.0
	Total	30	94.7	100.0	
Total	19	100.0			

For the purposes of a more linear results discussion for this specific test, the implications of the scoring system are evaluated in conjunction with the interpretation of the results contained in tables 6 to 8.

0 score

The subject is inaccurate with all their passes, no matter the time taken to complete the course and this is a poor reflection of the subject's ball-passing ability. 14.3% of the tight forwards, 5.9% of the loose forwards and 5.6% of the backs achieved this score.

5 score

Obtaining 5 computed points implies that the subject completes one accurate pass only, in a time greater than the course mean time, once again reflecting badly on the subject's passing ability at speed or under pressure. 28.6% of the tight forwards, 11.8% of the loose forwards and 5.6% of the backs obtained this score.

10 score

The computed score of 10 points can be interpreted in two ways:

The first possible interpretation is that while the passing accuracy of a participant in this category may be high (10 points = 2 accurate passes, 1 left and 1 right), the overall time taken to complete the test is more than the mean time for the specific positional grouping. This would therefore earn them 1 multiplier point and therefore a computed score of 10. The second interpretation is that the participant is less accurate in their passing (5 points = 1 accurate pass), but that the time taken to complete the test is less than the mean time for the specific positional grouping. This would, however, earn the participant 2 multiplier points, thus also arriving at a computed score of 10. By far the largest majority of all the positional groupings fell into this category, with 50% of the tight forwards, 58.8% of the loose forwards and 61.1% of the backs achieving this score.

20 score

A participant who achieves a computed score of 20 is highly skilled and able to accurately pass to both sides at speed and under pressure (10 points = 2 accurate passes, 1 left and 1 right). This implies that they manage to complete the course in less time than the mean, earning them 2 multiplier points and thus taking the computed total to 20 points. This is by far the ideal score to achieve for this test. 7.1% of the tight forwards, 23.5% of the loose forwards and 27.8% of the backs achieved this score.

While a computed total S-test score of 20 would be the ideal, from the results presented in tables 9 to 12, a more realistic computed total S-test score of 10 can be used as the differentiating score between good and poor performances. It can be observed that higher numbers of backs achieved scores of 10 (61.1%) and 20 (27.8%) as opposed to both loose forwards (55.6% and 22.2%) and tight forwards (46.7% and 6.75), showing that the backs and loose forwards display better handling skills than the tight forwards.

2. Kick for distance and accuracy

This test is self-devised and modified from the kick for distance test of Pienaar and Spamer (1995) in Pienaar and Spamer (1998). The results obtained in this test are presented in table 9. As it currently stands, this test can be used to some extent to get an idea of performance, but on the whole the benefit derived from the inclusion of this test in a testing protocol is that it simultaneously stresses the requirements for both distance achievement and accuracy. The standard deviations are rather high with this test, showing that the best attempts varied quite greatly. Further consistent testing and establishment of scores for comparison will rectify the cautionary issues pertaining to sample or base size sufficiently. Only the backs and loose forwards performed this test.

Table 9: Descriptive statistics for kick for distance and accuracy

Test	n	Minimum	Maximum	Mean	Std Dev
Kick for distance and accuracy (best attempt left) (m)	57	20.00	50.00	32.65	8.00
Kick for distance and accuracy (best attempt right) (m)	57	25.10	47.50	39.76	6.24

CONCLUSIONS AND RECOMMENDATIONS

From the preceding results and discussion, it can be concluded that this study adds to the burgeoning body of knowledge as it pertains to talent identification in rugby union in South Africa. Furthermore, from the unique sample group used, the conclusion can be made that not only does this study lend itself to the sport and position-specific identification of those individuals who currently hold promise or participate at lower playing levels who have not yet been "discovered", but can also be used to select those players who are currently "knocking on the door" to higher honours. The future sustainability of the success attained thus far should remain a top priority for all sporting bodies concerned with this sport.

In keeping with these sentiments, broader and more specific recommendations are that talent identification in rugby union in South Africa should continue unabated and as is. But, while the specific components (anthropometric, physical-motor, sport skill) used in this study and other rugby-based studies (Pienaar & Spamer, 1995 in Pienaar & Spamer, 1998; Pienaar & Spamer, 1996a, 1996b, 1998; Pienaar *et al.*, 1998, 2000; Hare, 1999; Spamer & Winsley, 2003a, 2003b; Van Gent, 2003; Van Gent & Spamer, 2005; Plotz & Spamer, 2006; Spamer & De la Port, 2006) are certainly valid, and robustly so, further investigation into other aspects of performance is essential. In trying to achieve just that ideal, this specific study included sport-vision testing and this is certainly unique to rugby union-based talent identification studies. Related to this, the testing protocol of this study can be used quite effectively on its own or even in conjunction with other testing protocols, and this serves as a recommendation in this regard.

By adopting a broader view, it is apparent in literature that there is now a greater tendency or bias toward talent development as opposed to the traditional talent identification approaches that are receiving ever-increasing criticism (Vaeyens *et al.,* 2008). In fact Vaeyens *et al.* (2008), who in making their case make note of those that voice this sentiment (Morris, 2000; Abbott & Collins, 2002, 2004; Martindale *et al.,* 2005), then go on to say that these studies also make the call for larger groups of young individuals to be afforded the chance to undergo proper development. As a result, there are some who recommend that talent identification or testing be assigned a monitoring role (Abbott & Collins, 2004) or that testing be utilised to find existing shortcomings for subsequent correction through individualised training initiatives (Vaeyens *et al.,* 2008). If sustained success is to be achieved in rugby in South Africa, the role players in the sport would do well to follow suit with regard to the broad-based developmental considerations of the sport. This is happening to some extent. It is the perspective of this study, though, that while the sentiment regarding talent development is certainly most valid, the specific function of talent identification is important and contributes to the overall development process, and that as Vaeyens *et al.* (2008) conclude, these two processes can and must be combined.

Last, but certainly not least, one of the most pertinent recommendations for future research is the adoption of a more multidimensional approach to talent identification. Vaeyens *et al.* (2008) do say that studies can be found where this is in fact happening. Adopting a multidimensional approach can be achieved by incorporating measures that address the psychological aspects of performance. This is true for all sports types. Some South African studies, such as Hare (1999) on rugby union and Nieuwenhuis *et al.* (2002) on hockey, have in fact quite successfully incorporated psychological measures in their testing protocols, and with good reason. Furthermore, such is the importance of aspects such as perceptual-cognitive ability on sporting performance that there are studies (Williams & Reilly, 2000; Williams & Ward, 2007; Vaeyens *et al.*, 2008) that propose that these perceptual-cognitive aspects, along with technical aspects, can better distinguish between skilled sport participants and their less skilled counterparts as they advance in their sport than some of the components (such as physiology and anthropometry) used in this study and others mentioned prior. This certainly provides food for thought for the future. This notwithstanding, the inclusion of tests aimed at the psychological (and if possible perceptual-cognitive) aspects of performance in future testing protocols is imperative, both in rugby union and other sports.

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