Comparing Gaelic Football to the Determinants of Winning Performance in Australian Rules Football at Unit-Level

George Brown

Cardiff Metropolitan University, Western Avenue, Cardiff CF5 2YB, UK; st20001590@cardiffmet.ac.uk; g.brown@live.co.uk; Tel.: +44 (0)13-5925-1766

Abstract: It has often been said that Gaelic football (GF) and Australian Rules Football (ARF) are similar sports, and amateur Gaelic footballers have been recruited to play in the professional Australian Football League. Using Wilcoxons's test, the significant ($p < 0.05$) factors differentiating winning and losing performance in ARF were indirectly compared to the differentiating factors between winning and losing in GF. Of the 15 key performance indicators (KPIs) that were seen to be significant between ARF teams, six (40 %) were also seen to be significant in discriminating between winning and losing GF teams. A Mann-Whitney U test was then completed to directly compare ARF and GF, twenty-six of the 30 KPIs were seen to be significantly different to each other ($p < 0.05$). The findings suggest that recruiting a Gaelic footballer based on the belief that their Gaelic background will aid their transition to ARF is not an appropriate decision. Instead, staying with more traditional methods of talent identification – for example anthropometric measurements – is advocated until further research is undertaken in this area.

1. Introduction

Australian Rules Football (ARF) and Gaelic Football (GF) have been described as similar sports [1,2,3]. The introduction of a "compromise rules" game played between the Irish and Australians further illustrates the close relationship between the two games [5,6,7]. Both sports utilise similar skills: kicking, catching/marking, hand-passing and tackling, and both sports include two different ways of scoring points as well, appearing similar to an onlooker when played [1,4,8]. Given the similarity between the sports, and that only ARF is a professional sport, some GF players ply their trade in the Australian Football League (AFL – *N.B.* the ARF governing body is also called the AFL). However, little academic research exists that directly compares both sports and as such other "within-sport" recruitment studies have been used to inform this paper. It is also pertinent to note that the AFL conducts draft combines, where players are put through a battery of tests intended to provide anthropometric data, physical data, and psychological data to all clubs within the league. Whether or not this form of player assessment is useful when players are moving from one code to another is up for debate.

1.1 Player Recruitment Trends

As football codes gained popularity and revenues increased the recruitment trends also altered – regardless of whether or not a draft system was in place – as teams could afford to look further afield for talent [9, 10]. This trend has been noted within the top soccer leagues of England, Germany, Spain, Italy and France with a pattern of increasing numbers of players from non-indigenous nations was seen [9], and in America's National Basketball Association where a rule change led to an influx of foreign players [10]. Moreover, there was also a change in player recruitment in European football after the introduction of the European Union and their laws on immigration [11]. These changes in soccer may, in part, be due to rule changes by FIFA – including the Bosman ruling [12]. Something similar may happen in ARF as the AFL has implemented

recruitment camps within America and Ireland [5], while also having a New Zealand-based scholarship program [13]. It could be suggested that this need to recruit from further afield is due to the higher demand for players after the introduction of expansion teams in 2011 and 2012 [5]. As such, there is a need to assess the suitability of Gaelic footballers to ARF performance.

1.2 Determinants of Winning Performance

Stewart Mitchell, H., & Stavros, C., [14] identified the coefficients for winning AFL performance, and contextualised them by assigning a certain number of points to each variable they measured. For example, they found that every bounce of the ball while running was worth 0.54 of a point, while other variables were found to be worth "negative" points (i.e. they were linked to the opposition scoring). In doing so, this can allow for the assessment of those important factors in another code. More generally, McGarry [15] identified the need for future performance analysis research to include information based on sporting behaviour and game outcomes, making note of the fact that a coach's job in professional sport is to generate winning performance. Jones et al. [16] also assessed the difference between winning and losing statistics in Rugby Union, finding few statistics that were significant. Other studies have attempted to identify the factors that differentiate better teams within sports [17, 18, 19]. As such, it is important to quantify the difference between successful and unsuccessful teams, as this can help identify the most important KPIs to select when scouting performers.

1.3 Cross-Code Analysis

While research has previously been completed that does, either directly or indirectly, compare more than one footballing code, it is mainly from a physiological or biomechanical perspective [1, 20, 21]. The mere existence of the World Congress of Science and Football, which presents research from all the footballing codes, indicates a level of crossover between the different codes. Kolt [22] agreed in his editorial, and also drew attention to the need to create a strong base of research if sporting performance within the football codes is to improve. Carroll [3] highlighted the fact that many GF coaches rely heavily on research conducted in the other football codes when attempting to apply scientific principles to their sport, while Morrissey Graham, Screen, Sinha, Small, Twycross-Lewis, and Woledge [23] used generic 'football code players' as their test subjects. Furthermore, most invasion games generally use similar performance indicators, and as such could be compared to each other [24]. This all suggests that there is a requirement to assess the similarities between each footballing code to identify the degree of overlap, and thus the level to which research in one code can be applied to another. This paper attempts to apply research conducted on ARF to GF for the purpose of player recruitment.

2. Results

2.1 Study One: Australian Rules Football Analysis

Figure 1 clearly shows that Total Kicks and Total Handballs are generally higher in winning performance. The surprising elements from Figure 1 are that, generally, winning teams do not win the stoppages (Centre Clearance, Centre Hit-Out, Total Clearances and Total Hit-Outs). Figure 1 also indicates the three statistics found to be significantly different between winning and losing. Goals were significant at a more sensitive level, suggesting its obvious importance within competitive performance. Some KPIs were seen to be close to significance; these have been reported as significant at the $p < 0.20$ level.

2.2 Study Two: Gaelic Football vs Australian Rules Football

Of the 15 KPIs that were seen to be significant between ARF teams, six (40 %) were also seen to be significant in discriminating between winning and losing GF teams (Table 1). Consequently, there appears to be little similarity between the two sports in terms of the differentiation between winning

and losing at team level and therefore further investigation into unit and position analysis in GF was undertaken. As there was a low level of similarity between the determinants of winning and losing in the two codes a Mann-Whitney U test was completed on the two groups to assess whether or not the two sports were different in terms of their overall KPI frequencies. This was completed by dividing the mean frequency by the total number of minutes the ball was in play for in both codes. It can be seen that 26 of the 30 KPIs were statistically significantly different, while one KPI was seen to be significantly different when the level of significance was reduced ($p < 0.20$) (Figure 2). This suggests that there is little similarity between the two sports.
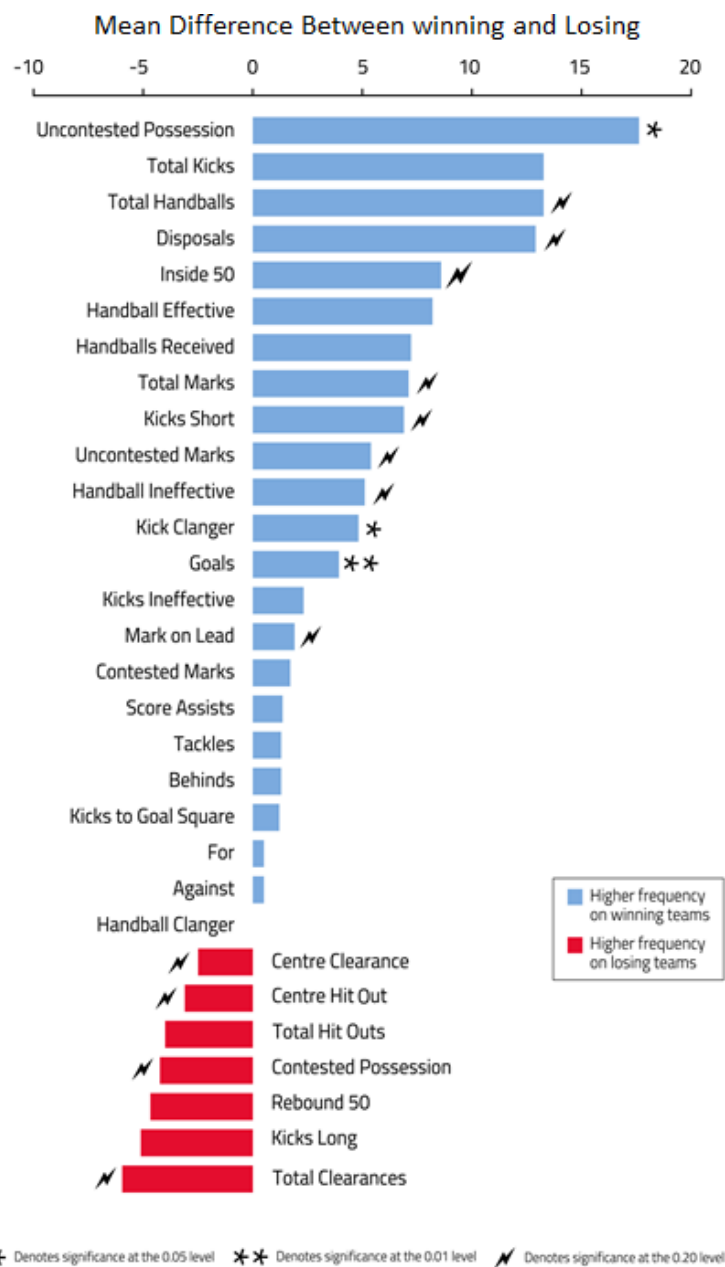

Figure 1. Mean difference between statistics for winning and losing teams

Table 1. Comparison of Significant ARF KPIs with GF

	Kicks Long	Kicks Short	Kicks to Goal Square	Kick Ineffective	Kick Clangers	Total Kicks	Handballs Effective	Handballs Ineffective	Handball Clanger
Z	-3.682	-3.677	-3.062	-3.710	-3.190	-3.674	-2.452	-3.697	-.996
Asymp. Sig. (2-tailed)	.000**	.000**	.002**	.000**	.001**	.000**	.014*	.000**	.319

	Total Handballs	Disposals	Handballs Received	Contested Marks/Catches	Uncontested Marks/Catches	Total Marks/Catches	Lead Marks/Catches	Contested Possessions	Uncontested Possessions
Z	-3.025	-3.677	-2.497	-3.241	-3.681	-3.677	-3.710	-3.677	-.327
Asymp. Sig. (2-tailed)	.022**	.000**	.013*	.001**	.000**	.000**	.000**	.000**	.744

	Frees For	Frees Against	Tackles	Centre Hit Outs	Centre Clearances	Hit Outs	Clearances	Inside 50s/45s	Rebound 50s/45s
Z	-2.005	-1.885	-3.679	-3.704	-3.725	-3.771	-3.771	-3.681	-2.705
Asymp. Sig. (2-tailed)	.045*	.059	.000**	.000**	.000**	.000**	.000**	.000**	.007**

	Goals	Behinds	Assists
Z	-3.732	-.783	-3.695
Asymp. Sig. (2-tailed)	.000**	.434	.000**

* Significant at the 0.05 level
** Significant at the 0.01 level
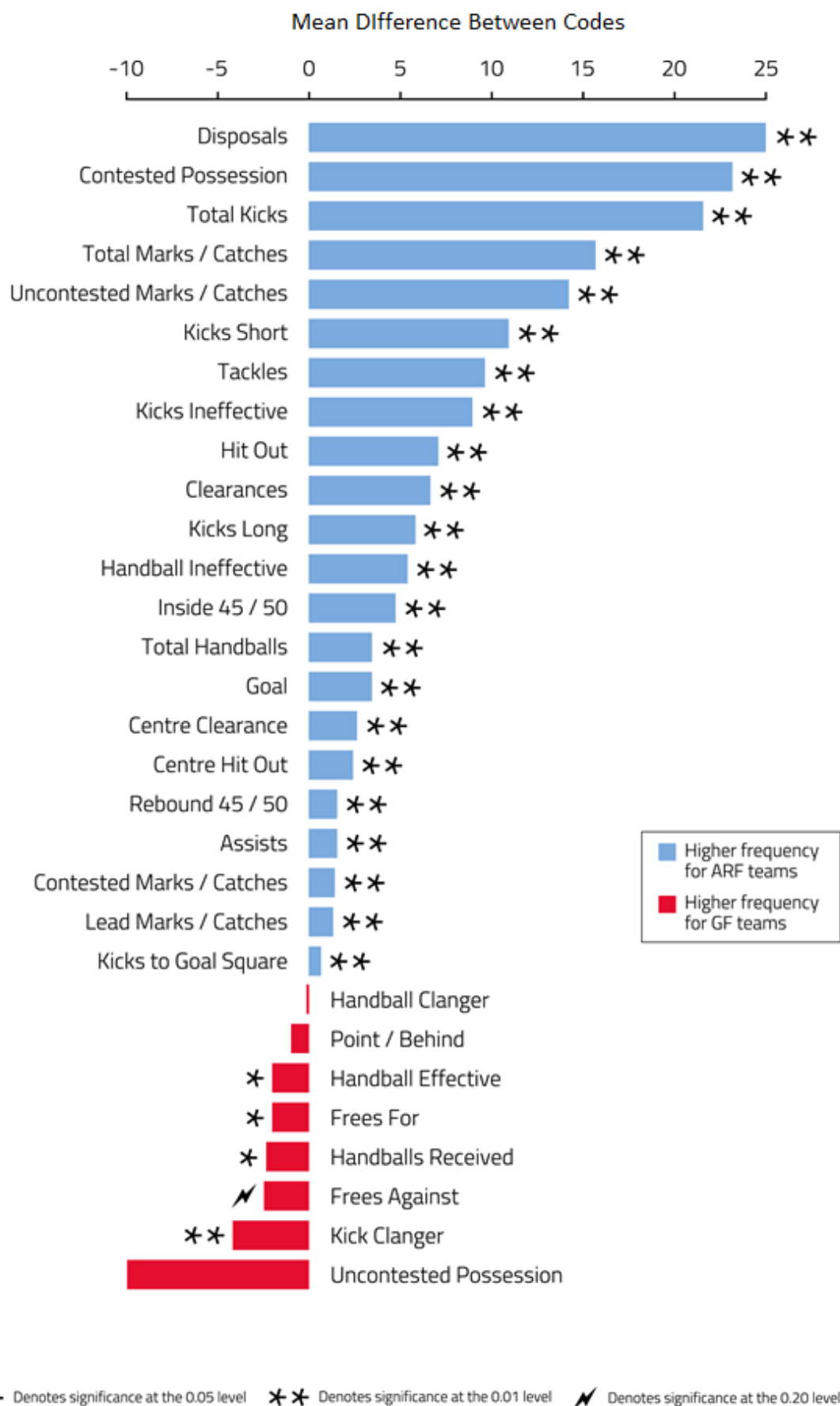■ Significant at the 0.20 level

Figure 2. Mean difference between ARF and GF KPI frequency

3. Discussion

3.1 ARF Results

The mean differences between winning and losing teams in ARF shows that using the normal levels of significance ($p < 0.05$ and $p < 0.01$) only uncontested possessions, kick clangers and goals were important to performance. When reducing the significance 12 further KPIs were seen to influence the outcome of a match (Figure 2). In general, the type of kick used seems to be important with more short kicks and fewer long kicks being seen to be important as well as more accurate kicking because clangers were significantly different between winning and losing. Completing more handballs was also seen to make a difference to winning performance, as well as uncontested marks and marks on a leading run. Some of this concurs with Johnston, Watsford, Pine, Spurrs, Murphy, and Pruyn [25] who found that high involvement in the game (a greater frequency of KPIs) was of great importance. This seems to suggest that a winning ARF team is one that has more supporting runs into space on the field, as well as greater accuracy across both forms of disposal. Interestingly, the number of stoppages was not seen to be significant to winning performance despite being a statistic often quoted in the media. This implies that it may be the position of the stoppage that is important rather than the frequency.

3.2 ARF vs GF Results

At a team level, very few of the KPIs that were significant ($p < 0.05$) in ARF were also significant in GF – this was unsurprising as both games last for different lengths of time. This form of indirect analysis was not enough to fully demonstrate the dissimilarity between the two codes, and direct analysis (Wilcoxon tests) was completed. Ensuring that the absolute values were converted to game actions per minute of ball-in-play time enabled more accurate analysis to be conducted. The results identified statistical differences between 26 of the 30 KPI, which infers that the two codes are inherently different.

3.3 Possible Explanation of Results

The results could be partially explained by some of the different rules in ARF and GF; as noted by Krauss [26] when the rules of a sport change the essence of the competition alters, as does the style of play. For example, in ARF defending players can tackle in a 'rugby-style' – if the player in possession of the ball does not dispose of it correctly, or holds onto the ball when they had prior opportunity to dispose of the ball, a turnover of possession of occurs. However, in GF if a player is held and cannot release the ball the player in possession retains the ball and receives a free kick. Therefore it is of greater importance to dispose of the ball in ARF, and thus there is a vast discrepancy between the two codes in this KPI. The same could be said of marking or catching the ball, as in ARF if a player is seen to have 'control' of the ball then a mark is called even if the player drops the ball when landing on the ground; however in GF there is no marking of the ball and if a player loses control of the ball after taking a catch the game simply continues. This may account for both the difference in marks/catches and in uncontested and contested possessions since it could alter the decision-making of the person kicking the ball and also change the way a player attacks a contested ball. The general reasoning behind rule changes are outlined within the review of the subject area by Arias, Argudo, and Alonso [27]. Anecdotal evidence may provide some insight into the reasoning behind the results of the current study. Although American football is often said to have been invented through augmentation of the rules of Rugby, over time the two sports have evolved in their own way and are now almost completely unrecognisable from one another. Furthermore, Rugby League and Rugby Union are both very similar sports but some would argue that the transition from League to Union is easier than from Union to League. The same may be true of GF and ARF, although due to the amateur status of GF it is unlikely that players from Australia would migrate to play in Ireland.

4. Materials and Methods

4.1 Study One: Australian Rules Football Analysis

4.1.1 Equipment

To ensure that the ARF analysis was completed efficiently and reliably the following equipment was used:

- PDF's of statistics from 10 AFL matches
- Apple iMac with Windows operating system, Microsoft Office 2010 (Microsoft Corporation, Redmond, USA) and SPSS (IBM, SPSS Statistics 20, New York, USA)

4.1.2 Game/Subject Selection and Key Performance Indicator (KPI) Selection

Games were selected by members of the AFL, and Geelong Football Club's first ten matches of the 2013 Toyota AFL season were used. There were 252 subjects whose ages ranged from 18-38. The KPIs used in the AFL analysis were the generic ones used by Champion Data Ltd, the AFL's statistics partner.

4.1.3 Data Organisation

Information was received from the AFL in PDF format, and then transferred into Microsoft Excel (Microsoft Corporation, Redmond, USA). This was deemed to be the most appropriate way to provide information and data on 10 games without jeopardising restrictions on the use of match videos. It was organised firstly by game, and then by team.

4.1.4 Analysis

Firstly, in Microsoft Excel, the winning and losing teams were determined by their points scored. Then, all the gathered KPIs were arranged according to match outcome and the difference between the winning and losing team for each statistic was derived, and then divided by the number of games to create a mean. If a lower frequency of a KPI indicated positive performance – for example "frees against" – then the number was inverted to reflect this. This made it easier to process the aspects of performance that were good and those that were poor. The following statistics were inverted:

- Kick clanger
- Handball clanger
- Frees against

Other graphical outputs were created through the use of percentages, whereby the overall contribution of a unit, position or "type" of game action (for example percentage of Short Kicks compared to Total Kicks) could be assessed to ascertain its overall importance within an ARF match. The same data was then transferred to SPSS and the non-parametric statistical test for difference between related samples (Wilcoxon test) was completed to assess whether there was a difference between winning and losing for each statistic gathered. Significance was initially set at the $p < 0.05$ level, and a lowered level of significance was also used ($p < 0.20$)

4.2 Study Two: Gaelic Football vs Australian Rules Football

4.2.1 Notation System

A hand notation system was used where game actions were tallied according to which performer completed them. The performance indicators used, and their operational definitions, mirrored, as far as possible, the performance indicators and operational definitions used by Champion Data Ltd in their ARF data collection.

4.2.2 Equipment

To ensure that the data was collected effectively, efficiently and reliably the following were used:

- Two notation sheets per team
- Two pens of different colour
- 9 DVDs of full-length GF matches
- Apple iMac with windows operating system and Microsoft Office 2010

4.2.3 Data Collection

Match footage was pre-recorded onto a DVD; this allowed the pause and rewind functions to be used to ensure that the data collected was as accurate as possible. In addition, where there was match information online regarding player line-ups this was used alongside commentary of the match to ensure that player identification was precise despite either the player being obscured from vision or due to poor quality match footage. The games were all Senior county matches from the 2013 season from different county competitions, ideally they would have all been from the league competition however due to a lack of televised GF matches it was impossible to complete in this way.

4.2.4 Procedures

The games were all pre-recorded and provided on a DVD, and opened in Windows Media Player. When observing the footage the same process of identification was followed while notating the game actions:

1. Which player performed the action
2. What game action occurred (kick, handball, catch, tackle etc.)
3. Description of game action (long, short, effective, ineffective etc.)
4. What kind of game action occurred (contested/uncontested possession, inside/rebound 45, score assist etc.)

The data on the notation sheet is in the form required in Excel, so this was then manually transferred into the software for initial analysis to take place.

4.2.5 Data Processing

Data was entered into Microsoft Excel, and initially arranged according to winning and losing teams. After this, the data was transferred to SPSS where Wilcoxon's tests were performed to assess which factors differentiate winning and losing in GF units and positions. Then, the results were compared to the factors that differentiate winning and losing ARF teams to assess the similarity between the two codes

5. Conclusions

The initial ARF analysis concurred with previous findings about midfielders being the most active players in the game, and also found there to be some variance in the mean differences between winning and losing units. Winning performance was generally seen to involve short kicks and uncontested marks – suggesting that having support runs and having the ability to find space are of vital importance. When using that as a basis to compare GF to ARF, there was very little to suggest the in-game activities of the two codes were similar - the two can be seen as inherently different games.

Although the current study has furthered knowledge of GF and ARF, there were limitations to the study overall. It is suggested that future research should include the following aspects:

- Development of specific, tailored, operational definitions to assess whether there are aspects of either game that were not coded but that are similar between the two codes,
- Include temporal and spatial information within a further study, to assess whether or not there are similarities between where game actions occur on the field of play,

- Develop a long-term study that assesses GF players' anthropometric data and follows them as they transition into ARF,
- Generate a way of including off-ball activities into the analysis.

5.1 Implications of Findings

The findings suggest that recruiting a Gaelic footballer based on the belief that their Gaelic background will aid their transition to ARF is not an appropriate decision. Instead, a move towards more traditional methods of talent identification – for example anthropometric measurements – is advocated until further research is undertaken in this area. However, on a general level the results relating to winning and losing ARF performance can be used because the reduced level of significance has allowed different facets of the game to be revealed as being important to match outcome, and should therefore be monitored throughout a season to assess a team's level of performance.

Conflicts of Interest: The author declares no conflict of interest.

Abbreviations

The following abbreviations are used in this manuscript:
AFL: Australian Football League
ARF: Australian Rules Football
GF: Gaelic Football

References

1   Reilly, T., & Doran, D. (2001). "Science and Gaelic football: a review", Journal of Sports Sciences, 19, 181-193
2   Carroll, L. (2008) http://www.melbournefc.com.au/tabid/7415/default.aspx?newsid=57179 [accessed on 25/10/2012]
3   Carroll, R. (2013). "Team performance indicators in Gaelic football and opposition effects". International Journal of Performance Analysis in Sport. 13. 703-715
4   www.afl.com.au. Available on: http://www.afl.com.au/development/aflexplained/history/tabid/10296/default.aspx [accessed on 25/10/2012]
5   www.afl.com.au. Available on: http://www.afl.com.au/news/2013-06-15/international-projects [accessed on 8/02/2014]
6   www.gaa.ie Available on: http://www.gaa.ie/about-the-gaa/international-rules/Background/ [accessed on 25/10/2012]
7   Reeves, S., & Collins, K. (2003). "The nutritional and anthropometric status of Gaelic football players", International Journal of Sport, Nutrition, and Exercise Metabolism. 13. 539-548
8   http://www.gaa.ie/about-the-gaa/our-games/football/ [accessed on 25/10/2012b]
9   Littlewood, M., Mullen, C., & Richardson, D. (2011). "Football labour migration: an examination of the player recruitment of the 'big five' European football leagues 2004-5 to 2008-9". Soccer & Society. 12. pp 788-805
10   Eschker, E., Perez, S., & Siegler, M. (2004). "The NBA and the influx of international basketball players". Applied Economics. 36. 1009-1020
11   Eliasson, A., (2009). "The European football market, globalization and mobility among players". Soccer & Society. 3. 386-397
12   Williams, A., & Reilly, T., (2000). "Talent identification and development in soccer". Journal of Sports Sciences. 18. 657-667
13   www.aflcommunityclub.com.au Available on: http://www.aflcommunityclub.com.au/index.php?id=739&tx_ttnews%5Btt_news%5D=850&cHash=b88b46ba3d552b11b29183ed4af0b714 [accessed on 08/02/2014]

14   Stewart, M., Mitchell, H., & Stavros, C. (2007). "Moneyball applied: Econometrics and   the identification and recruitment of elite Australian footballers". International Journal of Sport Finance. 2. 231-248

15   McGarry, T. (2009). "Applied and theoretical perspectives of performance analysis in sport: Scientific issues and challenges". International Journal of Performance Analysis of Sport. 9. 128-140

16   Jones, N., Mellalieu, S., & James, N. (2004). "Team performance indicators as a function of winning and losing in rugby union". International Journal of Performance Analysis in Sport. 4. 61-71

17   Csataljay, G., O'Donoghue, P., Hughes, M., Dancs, H. (2009). "Performance indicators that distinguish winning and losing teams in basketball". International Journal of Performance Analysis in Sport. 9. 60-66

18   Prim, S., van Rooyen, M., & Lambert, M. (2006). "A comparison of performance indicators between the four South African teams and the winners of the 2005 Super 12 rugby competition. What separates top from bottom?" International Journal of Performance Analysis in Sport. 6. 126-133

19   Lago, C. (2007). "Are winners different from losers? Performance and chance in the FIFA World Cup Germany 2006". International Journal of Performance Analysis in Sport. 7. 36-47

20   Orchard, J., Walt, S., McIntosh, A., & Garlick. (1999). "Muscle activity during the drop punt kick", Journal of Sports Sciences, 17, 837-838

21   Young, W., & Rath, D. (2011). "Enhancing foot velocity in football kicking: the role of strength training". Journal of Strength and Conditioning Research. 25. 561-566

22   Kolt, G. (2011). "Latest research in the football codes". Journal of Science and Medicine in Sport.   14. 183

23   Morrissey, D., Graham, J., Screen, H., Sinha, A., Small, C., Twycross-Lewis, R., & Woledge, R. (2012). "Coronal plane hip muscle activation in football code   athletes with chronic adductor groin strain injury during standing hip flexion". Manual Therapy. 2. 145-149

24   Hughes, M., & Bartlett. (2002). "The use of performance indicators in performance analysis".   Journal of Sports Sciences. 20. 739-754

25   Johnston, R., Watsford, M., Pine, M., Spurrs, R., Murphy, A., & Pruyn, E. (2012). "Movement demands and match performance in professional Australian football". International Journal of Sports Medicine. 33. 89-93

26   Krauss, M. (2004). "Equipment innovations and rule changes in sports". Current Sports Medicine Reports. 3. 272-276

27   Arias, J., Argudo, F., & Alonso, J. (2011). "Review of Rule Modification in Sport". Journal of Sports Science and Medicine. 10. 1-8