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What are talent scouts actually identifying? Investigating the physical and technical skill match activity profiles of drafted and non-drafted U18 Australian footballers

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Abstract

Objective: To compare the physical and technical skill match activity profiles of drafted and non-drafted under 18 (U18) Australian football (AF) players.

Design: Cross-sectional observational.

Methods: In-game physical and skill variables were assessed for U18 AF players participating within the 2013 and 2014 National U18 AFL Championships. Players originated from one State Academy (n = 55). Ten games were analysed; resulting in 183 observations. Players were sub-divided into two groups; drafted / non-drafted. Microtechnology and a commercial statistical provider allowed the quantification of total distance (m), relative distance ($m.min^{-1}$), high speed running distance (> $15km.hr^{-1}$), high speed running expressed as a percentage of total distance (% total), total disposals, marks, contested possessions, uncontested possessions, inside 50's and rebound 50's (n = 10). The effect size (d) of draft outcome on these criterion variables was calculated, with generalised estimating equations (GEE's) used to model which of these criterion variables was associated with draft outcome.

Results: Contested possessions and inside 50's reflected large effect size differences between groups (d = 1.01, d = 0.92, respectively). The GEE models revealed contested possessions as the strongest predictor of draft outcome, with inside 50's being the second. Comparatively, the remaining criterion variables were not predictive of draft outcome.

Conclusions: Contested possessions and inside 50's are the most influential in-game variables associated with draft outcome for West Australian players competing within the National U18 AFL Championships. Technically skilled players who win contested possessions and deliver the ball inside 50 may be advantageously positioned for draft success.

Key words: Talent identification; Talent selection; Predictive modelling; GPS; Notational analytics

1. Introduction

Talent identification (TID; the process of recognising current participants that are likely to excel) and talent selection (choosing the most appropriate individual of group of individuals to perform a specific task) both play a crucial role in the overall pursuit of excellence within elite sport.[1] Many elite organisations place large financial investments into the identification and selection of talented juniors,[2] with the goal of subsequently providing the most appropriate learning environment to accelerate their identified potential.[3] Manifesting from this investment, many governing sport organisations host annual draft combines to facilitate the talent selection process, in which the most talented juniors (predominately under 18 years of age) are invited to partake in a range of tests purported to quantify their physical abilities and technical skills. One such organisation, the Australian Football League (AFL), facilitates a National Draft Combine each November, in which approximately 100 under 18 (U18) players are invited to participate. Following completion of the Combine, each of the 18 AFL teams are provided the opportunity to recruit junior players whom they consider will add value to their team's chances of achieving success both immediately and longitudinally via the AFL Drafts.

Recent research has identified that U18 players drafted into the AFL following participation within the AFL National Draft Combine produced faster sprint times and displayed greater maximal aerobic capacities when compared to their non-drafted counterparts.[4] However, the scores obtained through these objective assessments only partially inform the talent selection process; with many elite club recruiters often preferring to simply watch the performance of juniors whilst in-game play.[5] Since 1995, the AFL have established an elite U18 competition referred to as the National U18 AFL Championships, in which the most talented juniors from each state play against one another throughout a four to six match tournament. These matches provide AFL recruiters with the opportunity to subjectively evaluate a juniors prospective playing potential by watching them display their skills in-game play.[5] Despite this additional in-game evaluation purported to assist with the selection process, there is scarce research investigating the physical and technical skill match activity profiles of drafted and non-drafted U18 players throughout these National Championships.

Within the AFL, the continued development of sports analysis technology, namely global positioning systems (GPS), has facilitated in-depth analyses into the physical match activity profiles of players.[6,7] Through such analyses, it has become apparent that the predominant movement profiles of players are intermittent; combining high intensity bouts of repeated running with prolonged periods of continuous lower intensity activity.[7,8] As such, some of the more common metrics reported relating to GPS include total or absolute distance (m), relative distance ($m.min^{-1}$) and high intensity running (distance (m) > 15 $km.hr^{-1}$).[9] In addition to quantifying the physical match activity profiles of players, commercial statistical providers; namely Champion Data© (Champion Data©, Melbourne, Australia), provide AFL teams with in-depth reports surrounding the technical skill activity profiles of players in-game play. These statistics; inclusive of but not de-limited to the total number of skill involvements (total possessions), the number of inside 50's (attacking passages of play) and the number rebound 50's (attacking passage of play from defence) are useful for both coaching and research purposes.[10] For example, recent research has indicated a rather inverse relationship exists between physical and technical skill match activity profiles, with successful (e.g. winning) AFL teams displaying a reduced physical output but greater number of efficient skill involvements when compared to their unsuccessful (e.g. losing) counterparts.[11] However, when compared the depth of notational analytics undertaken by Champion Data© within the AFL, there are a limited number of technical skill variables reported by the aforementioned commercial statistical provider throughout the National U18 AFL Championships given a reduction in resource availability.

Nonetheless, the considerable importance placed on the evaluation of in-game performance by AFL recruiters when identifying potential draftees; both GPS metrics and Championship Data© statistics are quantified, to an extent, during the AFL National U18 Championships. This data is often used to objectively support the subjective 'coaches eye' when talent scouts are judging a junior players prospective playing potential during the National U18 AFL Championships. However, given that little is actually known surrounding the difference in match activity profiles of drafted and non-drafted U18 players, the aim of this study was to compare both the physical and technical skill in-game statistics of these player groups in an attempt to uncover the in-game variables most predictive of draft outcome. It is hypothesised based upon previous research in the AFL,[11] that drafted players would possess greater skill involvements when compared to their non-drafted counterparts, whilst the physical profiles of both player standards would not differ considerably.

2. Methods

Players included within this study originated from one U18 State Academy; namely the West Australian (WA) State Academy (*n* = 55). In-game physical and technical skill variables were assessed for all WA U18 players participating within the National U18 AFL Championships between the 2013 and 2014 seasons. Data collected over the course of 10 games was retrospectively analysed, with four games being within the 2013 season and six being in the 2014 season; resulting in a total of 183 observations. Players were sub-divided into two groups based upon draft outcome; drafted or non-drafted. Out of these 183 observations, 77 were contributed by drafted players and the remaining 106 were from their non-drafted counterparts. Players were also sub-divided into Positions; namely forward, defence, midfield or ruck. The data utilised was derived from the year in which draft eligibility occurred for each player, and as such, only one year worth of data was used for each player. This was to ensure that a 'non-draft' outcome was not a resultant of age restrictions imposed on draft eligibility within the AFL; with this information being divulged by the State Academies High Performance Manager. This study was approved by the relevant Human Ethics Advisory Committee.

As a requirement of participation within the National U18 AFL Championships, each player wore a scapulae mounted portable GPS unit (Catapult Innovations, Team Sport 5.0, Firmware 6.54, 10 Hz, Melbourne, Australia) in a pouch embedded within the playing jumper. The GPS units and corresponding Firmware did not differ between the 2013 and 2014 seasons and where possible, players wore the same GPS unit each game. The data were downloaded after each game using propriety analysis software (Catapult Sprint Version 5.0.92, Melbourne, Australia) and the output file was exported to Microsoft Excel 2010 as a .csv file (Microsoft, Redmond, USA) for analysis. Only 'active playing time' was analysed and as such, quarter breaks and interchange periods for each player were omitted prior to analysis. The criterion variables used to quantify the physical profile of players were similar to previous research,[12] and were thus inclusive of absolute distance (m), relative distance ($m.min^{-1}$), high speed running distance (distance (m) > 15 $km.hr^{-1}$) and high speed running distance expressed as a percentage of total or absolute distance (% total). Previous work has suggested that these variables appear to be the most clinimetrically robust when compared to other GPS metrics.[9]

A specific selection of individual technical skill criterion variables for each game were retrieved from a commercial statistical provider (Champion Data©, Melbourne, Australia). Data from this provider has previously been shown to provide a reliable means for quantifying players technical skill match activity profile for AF.[13] This data was then entered into a custom designed Microsoft Excel spreadsheet (Microsoft, Redmond, USA, 2010); with the individual technical skill criterion variables utilised being presented within Table 1. These variables were selected as they were the only ones which were commercially accessible by Champion Data© (Champion Data©, Melbourne, Australia) during the National U18 AFL Championships between the 2013 and 2014 seasons.

******INSERT TABLE ONE ABOUT HERE******

Means and standard deviations (SD) were calculated for all physical and technical skill criterion variables for each group (drafted and non-drafted). The effect size of draft outcome on these criterion variables was calculated using Cohen's *d* statistic, where an effect size of $d = 0.20$ was considered small, $d = 0.50$ moderate and $d \geq 0.80$ large.[14] All pairwise comparisons were undertaken using Microsoft Excel (Microsoft, Redmond, USA, 2010).

To account for the repeated number of observations obtained on each player, generalised estimating equations (GEE) were used to model the extent to which in-game physical and/or technical skill criterion variables were associated with the main effect (draft outcome; two levels: drafted, non-drafted). Prior to this, a correlation matrix was constructed whilst controlling for Position and the repeated observations on each player. This was done to assess whether collinearity existed between any of the predictor variables. A total of 183 observations were included in the GEE models. Across this entire sample, there were a total of 39 forward observations (27 drafted), 53 defender observations (41 drafted), 77 midfield observations (27 drafted) and 14 ruck observations (11 drafted). The number of observations per player ranged from 1 to 6; with the average being 3.2 observations per player. The fluctuation in player observations was due to uncontrollable team selection strategies, whilst the uneven observation numbers for Position stemmed from the positional requirements of the game lending itself to a higher number of midfield type players, and was thus inevitable. Due to the skewed nature of the inside 50's and rebound 50's, both predictors were log transformed prior to inclusion in these analyses.

For all GEE's undertaken, an exchangeable correlation structure was used along with a binomial probability distribution where draft outcome was considered a binary dependent variable (0 = non-drafted, 1 = drafted). To describe the fit of each model, the quasi-Akaike Information Criterion (QIC) as described by Pan,[15] was used, where lower values indicate a better fit. Models were built using the *GEEPAK* for generalised estimating equations[16] in the R statistical computing software version 2.15.1 (R Developmental Core Team, Auckland, New Zealand, 2012). To ensure the strength of the best model, null model was built and used as a comparison.

3. Results

Means and SD's for each physical and technical skill criterion variable are presented in Table 2. The variables showing the greatest effect on draft outcome were contested possessions and inside 50's with large between group differences noted (Table 2). Specifically, on average, the drafted players obtained 7.5 ± 3.7 and 4.1 ± 1.9 contested possessions and inside 50's, respectively, compared to 4.1 ± 2.0 and 1.3 ± 1.2 contested possessions and inside 50's obtained by the non-drafted players, respectively (Table 2). The correlation matrix revealed strong associations between total disposals and both contested and uncontested possessions ($r = 0.878$ and $r = 0.724$), thus the former was removed from inclusion in these analyses. As depicted within Table 3, the first GEE model revealed contested possessions as the strongest predictor of draft outcome ($\chi^2 = 13.205$, $P \leq 0.05$), with inside 50's also providing a statistically significant contribution ($\chi^2 = 4.667$, $P \leq 0.05$). Comparatively, the remaining physical and technical skill criterion variables were not predictive of draft outcome ($P \geq 0.05$) (Table 3). Playing position was not predictive of draft outcome ($P \geq 0.05$) and was thus removed for the development of the second model. The second GEE model showed similar results to the first, with a slightly improved fit based on the QIC (202.287 vs 204.936). The third GEE model, including only statistically significant ($P \leq 0.05$) predictors, showed the best fit, despite the considerably reduced degrees of freedom.

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4. Discussion

This study aimed to compare the physical and technical skill match activity profiles of drafted and non-drafted U18 AF players in an attempt to uncover the in-game variables most predictive of draft outcome. Despite the perceived reliance placed upon in-game performance by AFL recruiters when attempting to identify potential draftees, to the authors' knowledge, research has yet to confirm this hypothesis. Results indicated that contested possessions and inside 50's were the variables most predictive of draft outcome; suggesting that of the ten variables investigated, it was these two that AFL recruiters appeared to judge somewhat higher than the others when selecting potential draftees. As such, these results hold important practical considerations for developmental coaches attempting to improve their aspiring junior AF player's likelihood of future draft success. Moreover, these results may see aspiring junior players look to develop their contested and attacking skill sets to conversely improve their draft prospects.

Specifically, given the highly collisional nature of AF,[17] players who can obtain (or retain) ball possession when under considerable physical pressure from the opposition would appear to be highly advantageous for a team's likelihood of success (e.g. winning). Additionally, given training practices, the game speed within the AFL is considerably faster to that seen within the National U18 AFL Championships,[18] and as such, it could be assumed that this may result in a higher number of collisions. Consequently, it could be inferred that AFL players are being placed in a greater number of contested scenarios than ever before; a speculation that is somewhat substantiated through the analysis of contested possessions (per team per game) within the AFL. Specifically, a progressive increase from 120 in the 2001 AFL season to 137 in the 2014 AFL season has been noted,[19] and as such, U18 players who can 'win' ball possession amongst a group of opposition players at an U18 level may be better equipped for the apparent increasing combative requirements within the AFL.

The very premise of AF is to invade space with the intention of scoring a goal. For this to take place, the ball needs to be consistently delivered into the team's forward line; often colloquially referred to as the 'forward 50'. Within the AFL, this particular statistic is often in favour of winning teams; with it being noted that in the 2013 and 2014 AFL seasons, both premiership winning teams, on average, obtained approximately 15 more inside 50's than the bottom ranked teams.[19] This is to be expected however, as it could be presumed that a higher number inside 50's is likely to result in a greater scoring potential irrespective of an oppositions defensive structure. Supporting this, notational analytics conducted in football have illustrated that total shots and total shots on target have been strongly associated with a successful match outcome (e.g. winning).[20] As such, players who can consistently execute this fundamental task would appear to increase their team's likelihood of scoring and thus ultimately winning; hence being looked upon favourably by AFL talent recruiters.

It is of note that the criterion variables used to reflect physical match activity profile did not differ according to draft outcome. Moreover, the mean difference in distance covered at high speed (e.g. > 15 $km.hr^{-1}$) (expressed both absolutely and as a percentage) was actually slightly higher for the non-drafted players. This may appear rather counterintuitive given both the nomadic requirements of the game along with previous research conducted in other team invasion sports.[21-22] Moreover, recent research in AF has shown that drafted U18 AF players obtained superior testing scores in both measures of sprint time and maximal aerobic capacity when compared to their non-drafted counterparts.[4] When combined with the current findings, this suggests that drafted U18 players are either unable to translate their apparent superior physical abilities into a game context, or the drafted players utilised throughout this study period were not physically maximising themselves in game-play. The latter conclusion suggests that perhaps the drafted players possessed superior tactical skills (e.g. contextual decision-making) and as such, are strategically able to place themselves in advantageous field positions; thus not having to exert themselves physically to remain within game play. Such a speculation is in agreement to that of previous research in AF,[11] noting winning AFL teams were characterised by a higher number of positive skill involvements and reduced physical match activity profiles in comparison to their loosing opposition. This draws the conclusion that perhaps more technically skilful AFL teams do not have to rely upon superior physical traits to perform at a high standard; a conclusion that appears to align itself with the current findings.

Given the applied nature of this research, study limitations were inevitable. Acknowledging the limitations associated with microtechnology,[9,23] and given data availability, this study could only utilise four physical criterion variables. Additionally, given the depth of notational analytics undertaken during the National U18 AFL Championships, only six technical skill criterion variables could be accurately utilised. As such, despite providing a rather comprehensive insight into the physical and technical skill match activity profiles of drafted and non-drafted U18 AF players, these findings would potentially be further strengthened by the inclusion of additional objective in-game performance markers. Additionally, given the data analysed originated from one State Academy (WA), it would be interesting for future research to be conducted on a larger scale to further assess the generalizability of the current findings.

5. Conclusion

Contested possessions and inside 50's are the technical skill criterion variables most associated with draft outcome for U18 players representing WA in the National U18 AFL Championships. Conversely, the physical match activity profiles of drafted and non-drafted U18 players did not appear to differ; suggesting that drafted players may be more strategically advanced, and as such, do not have to rely upon their physical abilities to perform at a high standard. These results have important training and/or game plan design considerations for developmental coaches attempting to improve the draft prospects of aspiring junior AF players.

6. Practical Implications

- Developmental coaches may wish to incorporate training drills designed to develop the contested game-play of aspiring junior AF players to assist with their AFL draft prospects.
- Coaches within the National U18 AFL Championships may wish to implement game plans designed around obtaining a high number of contested possessions and inside 50's to maximise the draft prospects of their players.

- Objective in-game notational analytics may assist the subjective evaluations made by AFL recruiters when attempting to identify potential draftees.

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Table 1. The technical skill criterion variables and corresponding description as utilised within this study

Technical criterion variables	**Description**
Total disposals	Summation of the total number of kicks and handballs
Total marks	Summation of the total number of marks both contested and uncontested
Contested possessions	The total number of possessions in which a player obtained and disposed of the ball within an opposition driven physically pressured context (i.e., obtaining and then disposing of the ball in a pack of opposition players)
Uncontested possessions	The total number of possessions in which a player obtained and disposed of the ball when under no physical pressure from the opposition
Inside 50	The total number of disposals in which a player delivered the ball (running with, or disposing of) into their attacking 50 m zone
Rebound 50	The total number of disposals in which a player removed the ball (running with, or disposing of) from their defensive 50 m zone

Table 2. Between group effects for each physical and technical skill criterion variable

Criterion variable	**Drafted**	**Non-drafted**	***d***
Absolute distance (m)	10120.5 ± 1419.1	10010.8 ± 1701.1	0.25
Relative distance ($m.min^{-1}$)	134.0 ± 17.8	129.0 ± 18.64	0.19
Distance > 15 $km.hr^{-1}$ (m)	2762.8 ± 750.8	2861 ± 942.9	0.16
Time spent > 15 $km.hr^{-1}$ (% total distance)	27.3 ± 5.9	28.2 ± 6.6	0.16
Total disposals	16.0 ± 7.0	11.4 ± 4.7	0.73
Total marks	3.5 ± 2.0	3.1 ± 1.9	0.18
Contested possessions	7.5 ± 3.7	4.1 ± 2.0	1.01
Uncontested possessions	8.8 ± 4.8	7.0 ± 3.8	0.42
Inside 50	4.1 ± 1.9	1.3 ± 1.2	0.92
Rebound 50	2.4 ± 1.3	1.7 ± 1.8	0.23

d is the effect size

Table 3. Results relating to the generalised estimating equations models run (dependent variable is 'Drafted = YES')

Predictor	**Model 1**			**Model 2**			**Model 3**		
	β (S.E.)	χ^2	*P*	β (S.E.)	χ^2	*P*	β (S.E.)	χ^2	*P*
Constant*	-9.881 (6.412)	2.375	0.123	-10.354 (5.937)	3.042	0.081	-3.032 (0.636)	22.715	<0.001*
Absolute distance (m)	0.001(0.001)	1.292	0.256	0.001 (0.001)	0.797	0.372			
Relative distance ($m.min^{-1}$)	0.001 (0.015)	0.010	0.994	0.017 (0.017)	0.947	0.330			
Distance > $15km.hr^{-1}$ (m)	-0.003 (0.002)	2.636	0.104	-0.003 (0.002)	1.952	0.162			
Distance > $15km.hr^{-1}$ (% total)	0.276 (0.200)	1.895	0.169	0.256 (0.200)	1.634	0.201			
Marks	-0.013 (0.105)	0.016	0.898	-0.080 (0.106)	0.559	0.455			
Contested possessions	0.384 (0.106)	13.205	<0.001*	0.385 (0.101)	14.324	<0.001*	0.356 (0.091)	15.207	<0.001*
Uncontested possessions	0.044 (0.061)	0.523	0.470	0.073 (0.060)	1.463	0.227			
Inside 50's	2.063 (0.955)	4.667	0.031*	2.543 (0.975)	6.794	0.009*	2.778 (0.813)	11.662	0.001*
Rebound 50's	-0.844 (1.054)	0.641	0.423	-0.730 (1.007)	0.526	0.468			
Position[#]		5.656	0.130						
Forward	0.090 (1.787)	0.003	0.960						
Defender	0.533 (1.780)	0.088	0.767						
Midfielder	2.042 (1.753)	1.357	0.244						
Model performance	QIC [df=12] 204.936			QIC [df=9] 202.287			QIC [df=2] 192.958		

β is the beta coefficient, SE is the standard error, QIC is the Quasi-Akaike Information Criterion, Wald's χ^2 is Wald's chi-square. Statistical significance accepted at ≤0.05 *Intercept-only model showed a QIC = 257.242, [#] reference category for Position is 'ruck'