Does Relative Age Distribution Influence the Physical and Anthropometric Profiles of Drafted under 18 Australian Footballers? An Investigation between the 2010 to 2013 Seasons

Carl T. Woods¹*, Sam J. Robertson², and Paul B. Gastin³

Abstract: This study examined if the relative birth distribution of drafted under 18 (U18) Australian football (AF) players influenced their physical and anthropometric profile. Birthdate, physical (vertical jump, agility, 20m sprint, 20m multistage fitness test) and anthropometric (standing height, body mass) data were obtained from U18 players drafted into the Australian Football League between 2010 to 2013 (n = 212). Birth distribution did not change across quartile \(\chi^2 = 5.09, P > 0.05\) or half year \(\chi^2 = 2.50, P > 0.05\). Physical and anthropometric profiles did not differ according to quartile or half year \(P > 0.05\). Relative birth distribution did not appear to influence draft success or physical/anthropometric profile. This study provides insight into a phenomenon not always observed in team sport.

Keywords: talent development, talent identification, team sport, relative age effect

Introduction

Within team sports it is common to note large physical and anthropometric differences between adolescents of the same chronological age, which are thought to predominantly result from maturational timing variation (Gastin, Bennett, & Cook, 2013; Gastin & Bennett, 2014). These differences can lead to a talent identification bias, with taller and/or stronger participants being looked upon more favorably by talent recruiters (Vaeyens, Lenoir, Williams, & Philippaerts, 2009). However, basing talent identification in team sports on such discrete measures can be misleading (Vaeyens et al., 2009), as physical and anthropometric qualities may not fully encapsulate a skillful performance or the potential for success (Woods, Raynor, Bruce, McDonald, & Collier, 2015). Thus, to help limit this identification bias, junior competitions often sub-divide participants into chronological age groupings, whereby they can compete against juniors of a similar age and potential maturation (Barnsley & Thompson, 1988). Despite these efforts, however, some juniors may still possess a physical and/or anthropometric advantage, thought to result from a potential relative age influence (Carling, le Gall, Reilly, & Williams, 2009; Cobeley, Baker, Wattie, & McKenna, 2009).

The relative age effect (RAE) has been described as a potential selection bias towards participants born early in the selection period of a given sport (Barnsley, Thompson, & Legault, 1992). It has been demonstrated in a range of team sports including soccer (Helsen, Van Winckel, & Williams, 2005; Van de Honert, 2009), basketball (Delorme & Raspoud, 2009), and more recently, Australian football (AF) (Coutts, Kempton, &

¹ James Cook University, Australia
* Corresponding Author: Discipline of Sport and Exercise Science, James Cook University, Townsville, Queensland, Australia. Email: carl.woods@jcu.edu.au
² Victoria University, Australia
³ Deakin University, Australia
Unsurprisingly, these sports all share a similar reliance on physical precocity and thus relatively older participants are believed to benefit from greater physical maturation when compared to their relatively younger counterparts (Figueiredo, Goncalves, Coelho E Silva, & Malina, 2009; Wattie, Cobley, & Baker, 2008). Consequently, coaches or talent recruiters may confuse physicality as a pertinent marker for future success, and unwittingly identify relatively older participants (Ashworth & Heyndels, 2007). Despite this, however, it is currently unknown if physical and/or anthropometric advantages in early adolescence, potentially associated with relative age, translate to longitudinal success in team sport. Moreover, potential physical performance advantages seen in early to middle adolescence (e.g., under 11-15 years of age) could diminish as participants progress into late adolescence (e.g., 18 years of age) and surpass biological maturation (Malina, 1994). Hence, late maturers may ‘catch up’ (physically and/or anthropometrically) to their early maturing counterparts.

In AF, a small body of work has been undertaken investigating the RAE on athlete selection. For example, Pyne, Gardner, Sheehan and Hopkins (2006) observed that relative age did not differ between players drafted into the Australian Football League (AFL) between the 1999 to 2004 AFL seasons. In contrast, Coutts et al. (2014) found a clear bias in the birth distribution of adolescent draftees between 2001 and 2012. Specifically, adolescent draftees had a tendency to be born in the first half of the year when compared to the national population, whilst a reverse RAE was noted in mature age draftees, which may suggest that any developmental disadvantages during adolescence in younger players may be overcome by adulthood.

Considerable work into this effect and its contribution to a successful performance has been noted in other sports, with Kirkendall (2014) recently finding that relative age exerted no influence on match outcome in youth (under 11 – under 16) soccer. Moreover, Karcher, Ahmaidi, and Buchheit (2014) showed that relative age had a limited influence on playing position and playing time during top-level handball competitions. Combined, these findings suggest that perhaps the physical performance advantages thought to occur from relative age may be slightly overemphasized and/or physical performance may not be the only factor contributing to a successful performance within team sport, particularly in late adolescence (Laund, 2013). Thus, we hypothesize that relative age distribution will not change within an U18 athletic cohort given athletes may have surpassed biological maturation (Malina, 1994) and any potential physical advantage resulting from a relatively earlier birthdate may have diminished (Schorer, Wattie, & Baker, 2013). Additionally, talent identification in such a cohort may be equally influenced by technical and tactical qualities not necessarily related to relative age (Baker, Schorer, Cobjley, 2010; Côte, McDonald, & Baker, 2006). The primary aim of this study was to examine the relative birth distribution of drafted U18 AF players to determine if there is a RAE within this homogeneous cohort. A second aim of this study was to examine whether the physical and anthropometric profiles of these players differed according to their relative age.

Method

Participants

Birthdates, physical and anthropometric performance testing data were assessed for all U18 players successfully drafted into the AFL between the 2010 to 2013 seasons. Players included in the study all originated from the three AF predominant states within Australia (Victoria, South Australia and Western Australia) (n = 212). All players completed the same physical and anthropometric testing battery as described by Robertson, Woods, and Gastin (2015). Although minor differences may have existed in assessment conditions between each of the years (i.e., time of day and temperature), all testing was completed
in an indoor stadium on hardwood floors. Access and consent to non-identifiable data was provided by each state-based organization in which the drafted players originated (TAC cup – Victoria; South Australian National Football League – South Australia; West Australian Football League – Western Australia) and the study was approved by the relevant Human Ethics advisory group.

**Procedures**

Following a standardized warm up which consisted of light jogging, countermovement jumps and dynamic stretching, all players had information collected relating to their standing height (cm), body mass (kg), standing vertical jump (cm), running vertical jump (both left and right leg) (cm), 20m sprint(s), the AFL agility test(s) and the 20m multistage fitness test (20m MSFT). The specific protocols and criterion variables for each test are detailed elsewhere (Woods et al., 2015). To assess if a RAE was present, all players were grouped into birth quartile (Q1: January – March; Q2: April – June; Q3: July – September; Q4: October – December) and half year (H1: January – June; H2: July – December). These categories have been used in RAE research elsewhere (Coutts et al., 2014; Pyne et al., 2006). Birth distributions for all live births in Australia between 1992 and 1995 were obtained from the Australian Bureau of Statistics (Australian Bureau of Statistics, 1993 - 1996).

**Statistical analysis**

Chi-square ($\chi^2$) analyses were used to test the main effect of birth distribution (both quartile and half year) for all U18 players drafted into the AFL between the 2010 to 2013 seasons when compared to the corresponding National birth statistics. One-way analysis of variance (ANOVA) was used to test the main effect of birth distribution across birth quartile (four levels: Q1, Q2, Q3, Q4) and half year (two levels: H1, H2) on the aforementioned physical and anthropometric variables for all drafted players. Statistical analyses were completed using Excel (Microsoft, Redmond, USA) and SPSS software (Version 19. SPSS Inc., USA). The Type-I error rate was set at $\alpha < 0.05$.

**Results**

Descriptive statistics ($n$ and percentage) relating to quartile and half-year birth distributions are presented in Table 1. Based on the chi-square analysis, the main effect of birth distribution of the drafted U18 players was not significant across quartiles ($\chi^2_3 = 5.09, P > 0.05$) or half year ($\chi^2_1 = 2.50, P > 0.05$) when compared to the National live birth statistics (Table 1). However, although not statistically significant, minor differences were noted for birth distributions of the drafted U18 players. Specifically, approximately 56% of players were born in the first half of the year compared to 44% being born in the second half of the year. Additionally, Q4 had the lowest birth distribution when compared to Q1, Q2 and Q3, with Q2 the highest.

Descriptive statistics (mean ± SD) relating to physical and anthropometric attributes of all players are reported in Table 2. The one-way ANOVAs revealed no significant differences for the main effect on any of the physical and anthropometric variables across birth quartile or half year ($P > 0.05$) (Table 2). Although not significant, a minor difference was noted for the score obtained on the 20m MSFT, with Q1 having the lowest value when compared to Q2, Q3 and Q4.
Table 1. Birth distribution of all U18 AFL Draftees between the 2010-2013 seasons

<table>
<thead>
<tr>
<th>Birth quartile</th>
<th>Half year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
</tr>
<tr>
<td>U18 AFL Draftees</td>
<td>212</td>
</tr>
<tr>
<td>Australian population</td>
<td>1036571</td>
</tr>
</tbody>
</table>

Note. χ², chi-square

Table 2. The quartile and half year physiological and anthropometric profiles (mean ± SD) of all drafted U18 players between the 2010-2013 Australian football seasons

<table>
<thead>
<tr>
<th>Birth quartile</th>
<th>Half year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q1</td>
</tr>
<tr>
<td>Standing Height (cm)</td>
<td>184.8 ± 6.5</td>
</tr>
<tr>
<td>Body Mass (kg)</td>
<td>77.9 ± 7.8</td>
</tr>
<tr>
<td>SVJ (cm)</td>
<td>64.2 ± 8.6</td>
</tr>
<tr>
<td>RLVJ (cm)</td>
<td>79.1 ± 10.8</td>
</tr>
<tr>
<td>RRVJ (cm)</td>
<td>71.5 ± 9.5</td>
</tr>
<tr>
<td>Agility (s)</td>
<td>8.60 ± 0.39</td>
</tr>
<tr>
<td>20 m sprint (s)</td>
<td>3.06 ± 0.10</td>
</tr>
<tr>
<td>20 m MSFT (level)</td>
<td>12.09 ± 1.01</td>
</tr>
</tbody>
</table>

Note. SVJ, standing vertical jump; RLVJ, running left vertical jump; RRVJ, running right vertical jump; MSFT, multistage fitness test. Significance was not evident at P < 0.05.
Discussion

This study examined the relative birth distribution of U18 players drafted into the AFL, whilst examining whether the physical and anthropometric profiles of these players differed according to their relative age. No statistically significant differences in birth distribution were noted throughout the year for drafted U18 players when analyzed across quartile or half year. Further, the physical and anthropometric profiles of players did not significantly differ according to birth distribution across the same periods. However, although not statistically significant, it is noteworthy that minor differences were evident for birth distribution, with approximately 56% of players being born in the first half of the year compared to 44% being born in the second half of the year. The vast majority of this difference appeared to stem from the comparatively lower birth distribution seen in Q4 (18%).

Our findings show some agreement to those reported by Pyne et al. (2006) who also did not note a significant effect of birth distribution for AF players drafted into the AFL between the 1999 to 2004 seasons. Although their study reported a particularly notable skew for 17 year old attendees at the national draft combine to be born in the first half of the year, it diminished within 18 year old attendees. Therefore, birth distribution was ultimately not significantly different between those subsequently drafted into the AFL. The authors noted that the skew shown within 17 year old attendees was partially due to the timing of the national combine within the calendar year and the age eligibility of players attending.

The results of this current investigation do not support the suggestions that relatively older participants possess a greater physical performance and anthropometric profile. However, it is highly probable that the players used within this study had already surpassed biological maturation given their chronological age (Malina, 1994), and as such, potential physical and anthropometric gains obtained by early maturers diminished as the late maturers ‘caught up’. Further, as the players investigated in the current study were all successfully drafted into the AFL, it is likely that their identification was equally driven by technical and/or tactical qualities that are important for success in the AFL and not inherently influenced by relative age (Malina, Eisenmann, Cumming, Ribeiro, & Aroso, 2004). Consequently, it could be argued that within early to middle adolescence (i.e., U11-15 years of age) relatively younger participants may develop superior technical and/or tactical qualities to allow them to successfully compete against their more mature counterparts (Ford & Williams, 2011). This development may hold them in greater stead for longitudinal success following maturation (e.g., U18 and beyond) given the superior development of the multidisciplinary (e.g., technical and tactical) skills required to succeed within team sports (Baker et al., 2010; Ford & Williams, 2011). Evidently, caution should be taken when identifying talent in junior team sport, as potential physical and/or anthropometric attributes associated with ‘transient inequality’ may not necessarily reflect long term success and thus mislead the talent identification process (Gastin & Bennett, 2014). Further, it may be worthwhile for talent identification scouts within AF (particularly within early to middle adolescent competitions) to equally base talent identification on technical and tactical qualities in addition to physical and anthropometric assessments. Such an approach is likely to provide a more stable insight into a junior player’s likelihood of longitudinal success. With this being said, it is important to note that such practices are sports-specific, hinging greatly upon the fundamental requirements of the sport and the ability to objectively assess these attributes.

It is worth noting that the results of this current study show some contrast with those of previous work in AF. Specifically, Coutts et al. (2014) noted a clear bias toward an earlier birth distribution for adolescent (< 20 years of age) AF players drafted into the AFL,
whilst this was not noted in this investigation. Several factors may possibly explain these differences. For example, Coutts et al. (2014) reported birth distributions of drafted players from 2001 to 2012 \((n = 736)\), whilst the current study reported on data from 2010 to 2013 \((n = 212)\), and was perhaps comparatively limited by its sample size. Although the current study observed some differences in birth distribution between quartiles, relative age did not appear to influence the physical and anthropometric profiles of players. To this end, these results are similar to research undertaken in other team sports. For example, Schorer et al. (2013) noted that the RAE diminished as elite adolescent team sport athletes moved into elite senior competitions. These authors cited a potential ‘catch up’ effect and a shift toward the importance of technical and tactical skill qualities for success, as reasons for this occurrence. Further, Coutts et al. (2014) reported a reverse RAE for mature draftees in the AFL, noting that chronically older draftees had a tendency to be born later in the selection year. Recently, both Robertson et al. (2015) and Woods et al. (2015) showed that elite U18 AF players possess enhanced physical and anthropometric characteristics when compared to sub-elite age-matched peers. However, Robertson et al. (2015) found no differences in birthdate distribution between drafted, national championship and state-level players, suggesting that this advanced athletic profile may not be underpinned by relative age. Perhaps the superior physical profile shown by drafted U18 AF players could result from advantageous genetic factors or differences in training background. For example, pre-adolescent athletes exposed to specific integrated neuromuscular training may show exponential physical improvements well into late adolescence and adulthood, irrespective of relative age, when compared to pre-adolescents not exposed to such training practices (Myer, Lloyd, Brent, & Faigenbaum, 2013).

Despite our findings, it is clear that a RAE does exist in certain team sport programs/leagues (for examples, see Barnsley et al., 1992; Delorme & Raspaud, 2009; Coutts et al., 2014); however, the magnitude of its influence clearly varies between chronological age grouped competitions. The RAE appears to be a complex phenomenon, with a range of maturational (Malina, 1994), and/or organisational eligibility constraints (Pyne et al., 2006) potentially influencing its occurrence in sport. Given the results from this study, it would be interesting to examine the influence of relative age on higher selection within a lesser-aged (i.e., U16) AF competition. Specifically, it is likely that the RAE may be a more prominent factor for talent identification within an earlier age grouping, as maturation variations due to relative age may be more pronounced and result in a selection bias toward more physically mature participants.

**Conclusion**

The results of this study indicate that draft success for U18 players between the 2010 to 2013 AF seasons was not influenced by relative age. Additionally, the physical and anthropometric profiles of these players did not differ according to the quartile or half year of birth. Evidently, this study provides an interesting insight into what is a rather complex phenomenon and suggests that the superior physical and anthropometric qualities shown by elite U18 AF players may be underpinned by factors other than relative age, requiring continued examination.

**References**


Barnsley, R.H., Thompson, A.H, & Legault, P. (1992). Family planning: football style: the relative age effect in
Relative age in Australian football


The Authors

Dr Carl Woods is a lecturer of Skill Acquisition and Motor Learning in the Discipline of Sport and Exercise Science at James Cook University. His research primarily focuses on talent identification, talent development and coaching in junior team sports, with a particular interest in Australian football. He currently provides research support to Australian football State Academy programs, with this being oriented around different aspects of performance analysis and coach development.

Dr Sam Robertson is a senior research fellow at Victoria University who also holds a joint appointment as the Senior Sport Scientist at the Western Bulldogs AFL club. His research focuses predominantly on applications of statistical and machine learning approaches to sports science. He has previously worked as a sports scientist in national sporting institutes in Australia and the United Kingdom and has also managed the Research and Innovation for the Golf Australia High Performance Program since 2011.

Paul B Gastin is an associate professor in the Centre for Exercise and Sport Science at Deakin University, Australia. His research and consultancy is multidisciplinary and focuses on athlete monitoring, performance management and sport system development.