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Original research

The influence of age-policy changes on the relative age effect across the Australian Rules football talent pathway

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ABSTRACT

Objectives: To identify the influence of age-policy changes on the relative age effect (RAE) across the Australian Football League (AFL) talent pathway.

Design: Retrospective cross-sectional analysis of junior AFL players attending the National Draft (National), State, and State Under 16s (U16) combines between 1999–2016.

Methods: Birth-date data was obtained for players attending the AFL State U16 (n = 663, age: 15.9 ± 0.4 years), State (n = 803, age: 19.1 ± 1.7 years), National (n = 1111, age: 18.3 ± 0.8 years) combines. Corresponding aged-matched Australian general population birth rate data was also collected.

Results: A chi-squared analysis comparing birth month distributions found all combine groups differed significantly from the general population (Under 16s: $\chi^2 = 62.61$, State: $\chi^2 = 38.83$, National: $\chi^2 = 129.13$, $p < 0.001$). Specifically, Under 16s had greater birth frequencies for months January to March ($\geq 2\%$, $p < 0.05$), with more State players born in January (4.9%, $p < 0.05$). Age-policy changes at the National level reduced birth distribution bias for some months, however the RAE remained for March, June and July (3.9%, 6.1%, 4.3%, $p < 0.05$). State U16s and National players had 2–9% lower birth frequencies for November–December births compared general population.

Conclusions: Selection bias exists towards older players is present at the AFL's State U16, and is maintained at State and National level combines. Age-policy changes are only partially successful at addressing the RAE at the National level, with alternative strategies also recommended in order to address the RAE across the AFL talent pathways.

1. Introduction

The relative age effect (RAE) is a demographic characteristic where a bias exists towards selecting athletes born earlier in a defined age group year comparative to those born later.[1–3] The prevalence of the RAE has been described in several team sports (i.e., ice hockey, baseball, soccer, and basketball).[4–6] A common environmental constraint in junior sport is the placement of children into annual age-grouped teams to balance competition between players of similar skill and maturity.[7,8] As such, RAE usually occurs in more physically demanding sports, with up to a year of developmental variation in skill and maturity levels arising amongst players within a single age group.[4,7,9] This developmental variation between chronological age and biological maturation is considered an individual constraint amongst players.[3,5,8] The task constraints within the game, player position, and competition level in Australian football (AF) place value on skill, physical strength, speed, and aerobic capacity. As such AF is susceptible to the RAE within talent development pathways, as there is an increased pressure to identify and select talented players into highly competitive junior state and national competitions.[2,8,10] The consequence of the RAE is that talented late-developers may be overlooked at talent selection points, as early developers exhibit the physical and skill characteristics valued by coaches and talent scouts.[2,11,12]

The Australian Football League (AFL) participation pathway is comprised of the local participation pathway and the talent pathway, with many elite level players progressing through the latter.[13,14] The first major AFL talent selection point is the State

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U16, with players recruited from the local participation pathway into a representative team consisting of the most talented players from each Australian State.[13] Talented local level players overlooked at the State U16 level may be invited by the AFL to attend the State and National level combines, with subsequent selection into these development squads.[13,14] Elite AF players are usually selected through the annual AFL National Draft, with most players nominated from National junior teams.[13,15]

Specific to this investigation, a selection bias in birth distributions of National junior players drafted into the AFL has been reported, with more players born in the first half of the selection year (60% vs. 40%).[2] Furthermore, 56% of State junior Under 18 (U18) AFL draftees were born in the first half of the year compared to the second half (44%).[16] Contrary to this, a reverse RAE exists for mature aged AF draftees (those drafted over the age of 20), with 63% born in the first half and 37% in the second half.[2] The bias in birth distribution within junior talent levels of the AFL pathway may be attributed to the differences observed in biological maturation between talent selected and non-selected AF players' of similar age.[2,12,17] These differences have also been observed in local level players aged between 11 and 19 years, with biological maturation having strong positive correlations with 20-m sprint time, aerobic capacity, and high-intensity game running.[12,18] As such, the RAE is linked to athlete dropout rates, with players born later in the selection year having a performance disadvantage compared to older players, thus contributing to them being overlooked for representative AF squads.[1,4,18] However, to date no research has assessed the prevalence of the RAE in the AFL's State U16 level, with further analysis required to determine whether RAE exists within this AFL talent pathway level.

Numerous policy changes have been suggested to eliminate or reduce the RAE in individual and team sports, with many involving the modification of age-groupings for competition.[7,19,20] Further policy change recommendations include; grouping players based on their biological maturity,[19,20] shifting selection dates for talent and elite teams,[7,8,20] and allocating uniform numbers based on the relative age of players.[7] Policy modifications specifically targeting the RAE require sporting organisation's to make dramatic changes to their competition structures, with organisation seeking more simple methods to reduce the RAE.[7] As such, it is difficult to implement and test these policy changes within a sporting organisation's talent identification structure, leading to limited research regarding the impact of policy change on reducing the RAE.[7] Some studies have found changing selection dates only shifted the bias to the first month of the new selection year.[10,21] However, selection bias in junior soccer was reduced when numbering players shirts according to their relative age within the team, allowing talent scouts to clearly identify early and late developing players.[7]

The AFL have implemented two changes (in 2003 and 2008, see Table 1) to talent selection policies between 1999 and 2016. These policy changes were specifically aimed at minimising the impact of the RAE on players transitioning through the development pathway. The policies imposed restrictions on the age in which players were invited to attend National Draft camps, and elite club's ability to select players through the AFL's National Draft. However, to date there is no empirical evidence concerning the impact these policy changes had on reducing the RAE.

While there is evidence of the RAE in AF, no studies have analysed the RAE in the modern era (past 17 years) of the AFL's National, State, and State U16 testing combines. The annual combines are physical and skill testing days for talent identification of elite (National) and sub-elite (State) junior players, as well as being the entry point into the AFL's talent pathway (U16s).[15,22,23] The point at which the RAE originates within the AFL talent pathway should be identified to allow more targeted selection interventions that address the RAE. It is unknown whether the distribution of play-

Table 1

AFL National Draft Combine birth month codes based on player invitee age rules and policy changes between 1999 to 2016.

Draft years	Analysis sub-section	Draft selection rule
1999–2003	Pre-2003	Players required to turn 17 years by June 30
2004–2008	2004–2008	Players required to turn 17 years by April 30
2009	Post-2009	New AFL team introduced (Gold Coast Suns, GC) – able to select 12 players turning 17 years by 1st January. All other players required to turn 18 years in draft year
2010	Post-2009	New AFL team introduced (Greater Western Sydney, GWS) – able to select 12 players turning 17 years by 1st January. All other players required to turn 18 years in draft year
2011	Post-2009	GC trade rights to 2 players aged 17 years by 1st January. All other players required to turn 18 years in draft year
2012	Post-2009	GWS trade rights to 2 players aged 17 years by 1st January. All other players required to turn 18 years in draft year
2013–Current	Post-2009	All players turn 18 years in draft year

ers selected to participate from each year quartile differs between those at the National, State, and U16 combines. Furthermore, it is unclear whether the age-policy changes regarding players invited to the AFL National Draft has affected the RAE at this level. The aim of this study was to (i) determine the prevalence of the RAE across the AFL talent pathway between 1999 and 2016, and (ii) analyse the influence that age-policy changes of National Draft invitees have had on the RAE at the National level.

2. Methods

This study used a retrospective cross-sectional analysis to assess the RAE and impact of the AFL's age-policy changes within the junior National, State, and State U16s combines held between 1999 and 2016. Date of birth (DOB) data was obtained for players attending the AFL National Combine (n = 1111, age: 18.3 ± 0.8 years), State Combine (n = 803, age: 19.1 ± 1.7 years), and State U16 Combine (n = 663, age: 15.9 ± 0.4 years). National player data was available for all years between 1999–2016, with State and State U16 player data only available between 2004–2016 and 2008–2016 respectively. Players were classified by the Combine level they attended (National, State, State U16), then further classified into birth month (1 to 12; starting with January as '1'), and quartile (Q1: January–March, Q2: April–June, Q3: July–September, Q4: October–December) categories.

The frequency of male births by month in the general population was obtained from statistics on monthly live births between 1981 and 2000 reported by the Australian Bureau of Statistics.[24] Birth statistics were calculated for three different periods to match (as close as possible) the birth cohorts for the three combine groups: the AFL National Combine (birth years 1981–1998), the State Combine (birth years 1985–1997), and State U16 Combine (birth years 1992–2000). Ethics approval for this research was obtained by the Victoria University Human Research Ethics Committee.

Changes in age eligibility policies that effects a players' invitation to an AFL National Draft Combine between 1999 and 2016 were accounted for within the analysis. The policy changes imposed by the AFL regarding age of eligible Draft attendees are presented in Table 1. To account for age-related policies imposed