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Coaches' Perceptions of Long-Term Potential are Biased by Maturational Variation.

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ABSTRACT

Talent identification and development programs seek to recognise and promote athletes with long-term potential in a particular sport. Coaches involved in these programs are often required to make inclusions or exclusion decisions based on their perceptions of an athlete's long-term potential. However, biological maturity can influence physical capabilities of adolescent athletes and may bias coaches' perceptions of long-term potential. This study explored the relationship between coaches' perceptions of long-term potential and variations in athlete's biological maturity. Talented adolescent male Australian footballers from nine (n= 264) different teams were recruited to provide basic anthropometric information for estimates of biological maturity. Coaches from each team were recruited to provide a rating of their own player's long-term potential. Coaches perceived late maturing athletes to have a significantly lower long-term potential than their average ($\chi2$=9.42, p<0.01) and early ($\chi2$=5.86, p=0.04) maturing counterparts. Of the late maturing athletes, 72% were predicted to go no further than adolescent competition. No concurrent bias was evident between the average or early maturing athletes. The findings of this study demonstrate coaches perceptions of long-term potential can be biased by maturational variation in adolescent

athletes. Such perceptual bias may impact on coaches selection decisions and result in talented but late maturing athletes missing selection into development pathways.

Key Words: Australian Football, Talent Pathway, Adolescent Athletes

INTRODUCTION

The identification and subsequent development of talented young athletes is paramount in ensuring athletes attain their full potential and provide continuous elite athletes through to senior competition [1]. However, development pathways are typically expensive to run [2] and are associated with poor athlete retention into senior professional competition [3-5]. Development pathway coaches play a critical role in talent identification and the athlete development processes [1]. Coaches often select or de-select athletes from development pathways based on their perceptions of an athlete’s long-term sporting potential [6]. Understanding factors that affect coaches’ perceptions of athletes would enable greater coaching education and potentially modify selection outcomes in the interests of improving development pathway efficiency.

Coaches of young athletes have the difficult task of assessing athlete’s long-term potential and make subsequent selecting decisions for inclusion or exclusion into development pathways [7]. However, in adolescent athletes, variations in biological maturity can be large [8] which, directly impact on match [9, 10] and physical performance outcomes [11, 12]. Early maturing athletes are at a significant performance advantage over their later maturing counterparts, with advanced vertical jump, sprint, strength and aerobic capacities seen in athletes of greater biological age [13-15]. Advantages associated with greater maturational age have also been linked to match running performance in both adolescent Soccer [9] and Australian Football [10], demonstrating that physical advantages translate to performance benefits in matches. However, these maturational advantages reduce with age, as variations in biological maturity becoming less pronounced and completely diminish once full adult status is attained [8]. Adolescent differences in stature and performance due to maturational variation may confound coaches' perceptions of an athlete's long-term potential.

Coaches' perceptions of athletes may be biased by factors associated with size or maturational advantage. In adolescent competition where stature (height and weight) and physical performance is influenced by maturity [8], coaches may develop biased perceptions of long-term potential due to the advantages associated with greater biological age. Previously, it has been shown that stature can influence perceptions of athletic ability [16]. However, this study was limited to soccer players rating the perceived athletic prowess of a size adjusted image of a goalkeeper, and so may lack practical and coaching application. Despite perceptions of potential guiding coaches' selection decisions in adolescent development pathways, no research has yet explored the link between perceptions of potential and maturational variation. This study aimed to examine if maturational variation in youth Australian Footballers influenced coaches' perceptions of long-term potential.

METHODS

Athletes (n= 264, age 15.62 ± 0.28 years) and coaches (n= 9, age 40.88 ± 7.59. years, coaching experience 12.50 ± 3.74 years) recruited for this study were from nine teams involved in the semi-elite, under 16s (U16s) Western Australian Football League (WAFL) competition. Athlete participants attended a screening day where the basic anthropometric variables of height, sitting height and weight where measured. Height measures and mass were assessed to the nearest 0.001 m and 0.1 kg using a stadiometer (PE, Sportforce, Australia) and electric scales (Model UC-321, A&D Mercury Pty. Ltd., Australia). Sitting height was measured by sitting participants on a 0.42 m seat with their buttocks and shoulders against the stadiometer. These variables were then input into a regression equation to estimate maturity, using the predicted age at peak height velocity (PHV) method developed by Mirwald et al. [17]. The equation used was as followed.

$$Age\ at\ PHV = -9.326 + (0.002708 \times [\text{leg length} \times \text{sitting height}]) - (0.001663 \times [\text{age} \times \text{leg length}]) + (0.007216 \times [\text{age} \times \text{sitting height}]) + 0.02292 \times (\text{weigth}/\text{height})$$

This method provides a reliable and non-invasive means of assessing biological maturation, with a coefficient of determination 0.92, a standard error of measurement 0.49 years, and a mean difference of 0.24 ± 0.65 years between a verified sample of actual and predicted boys [17]. Years from PHV (Y-PHV) were calculated by subtracting age at PHV from chronological age. Players were then classified as late (Y-PHV below 1.16 years, n=58) average (Y-PHV between 1.17 and 2.15 years, n=154) or early (Y-PHV above 2.16 years, n=52) maturing. These groups were constructed by adding or subtracting 0.50 years from the average Y-PHV (1.66 ± 0.62 years), resulting in at least one year maturational difference between late and early maturing groups [18].

The coaches were asked to rate the perceived long-term potential of athletes in their team, via a questionnaire. The questionnaire asked what level of competition they thought the athlete would ultimately attain (1, semi-elite adolescent competition; 2, semi-elite senior competition; 3, professional senior competition).

Anthropometric variables were reported using mean and standard deviation. Perceptions of long-term potential were examined using chi-squared ($\chi 2$) analysis. Statistical analyses were carried out using SPSS software (Version 22.0, SPSS Inc., USA). Statistical significance was set at $p<0.05$.

RESULTS

At the time of assessment, the average years from PHV was 1.66, with a range of 0.27 years before peak height velocity to 3.73 years after PHV, resulting in a biological age differential of 4 years. Anthropometric information collected is reported in Table 1.

*****Table 1 near here*****

Fisher's exact chi-squared test was used as both the late and early maturing groups had less than 5 athletes with perceived AFL potential. The chi-squared analysis revealed a significant between group difference when comparing maturational groups and perceived potential ($\chi2=9.99$, $p=0.04$). As show in Figure 1, the differences appeared to be between the late-maturing group compared to both the average and early-maturing groups. A sub-group chi-squared analysis confirmed this, with the late-maturing group having a significantly different distribution compared to the average ($\chi2=9.42$, $p<0.01$) and early ($\chi2=5.86$, $p=0.04$) groups. No significant difference was evident between the average and late-maturing groups.

*****Figure 1 near here*****

The proportional breakdown of maturational groups and coaches' perceptions of long-term potential can be seen in Figure 1. Of those in the late-maturing group, 42 (72.4%) were expected to progress no further than adolescent selection, 14 (24%) were expected to make senior teams, and 2 (4%) were predicted to make professional teams. Coaches' perceptions of the average-maturing group were; 76 (49%), 69 (45%), and 9 (6%), respectively. Coaches' perceptions of the early-maturing group were 26 (50%), 23 (44%) and 3 (6%); for adolescent, senior, and professional competition respectively.

DISCUSSION

The aim of this study was to explore if coaches' perceptions of an athlete's long-term potential are associated with variations in biological maturity. Results from this study demonstrate that coaches perceive late-maturing athletes to have a lower long-term potential, than their more biologically mature counterparts. No concurrent bias was evident between the average and early-maturing groups.

Development pathways are tasked with the role of ensuring the development of talented junior individuals for senior competition. Within these pathways, it often falls to coaches to make inclusion or exclusion decisions of athletes, based on both objective data collected (i.e. anthropometric measures, fitness testing and match statistics) and subjective opinions of skill and potential. However, research has consistently shown that maturational variation can significantly impact on objective measures commonly used, with those of advanced maturation likely to perform better in testing [15] and match situations [9, 10]. This study demonstrates that subjective bias also occurs, with coaches’ perceiving late-maturing athletes to have a lower long-term potential than their average and late-maturing counterparts.

Previously it has been shown that stature can influence perceptions of athletic ability [16]. However, the results of this study lack application to real-world coaching environments because it used soccer players to rate the hypothetical goalkeeping ability when viewing several size adjusted images of a goal keeper. To the authors’ knowledge, this is the first study to explore how coaches’ perceptions of athletes within their own team can be influenced by maturational variation.

The results of this study have direct implications for coaches of development pathways, especially those who coach athletes around 15-16 years of age. For instance, since selection and de-selection decisions are often based on coaches’ perceptions of long-term potential, the lower perceptions coaches have of late maturing athlete’s long-term potential may reduce their likelihood of selection into development pathways. Whilst the selection of more mature athletes may contribute to success in adolescent competition [19], such selection biases may prove erroneous longitudinally as performance advantages associated with maturational variations diminish once full adult status is attained [20]. Coaches should therefore be aware that when assessing the long-term potential of athletes, maturational variation within the playing population can greatly affect performances. Acknowledgment of these maturational and subsequent performance variations may then serve to moderate opinions and reduce perceptual biases.

A limitation of this study was that actual long-term potential of the athletes used in this study was not undertaken, to validate coaches' perceptions. Further, the results of this study are also limited to Australian Football. Future research is required to establish if such perceptual biases exist in sports with different physical demands. Future research should also seek to longitudinally explore how accurate coaches' perceptions of an athlete's potential are and what factors contribute to athletes attaining or fail to reach these expectations.

CONCLUSION

The findings of this study demonstrate that coaches' perceptions of athlete long-term potential are associated with maturational variation. Coaches in this study perceived late maturing athletes to have a lower long-term potential, when compared to their early and average-maturing counterparts. Maturational differences in age matched athletes can be as large as 4 years, which is likely to contribute to performance variations. Coaches should be aware that performance variations associated with delayed maturity can impact the perception coaches have on an athlete's long-term potential. Given that coaches' selection and de-selection decisions are likely to be based on their perceptions of an athlete's long-term potential, late-maturing athletes may be at an increased risk of de-selection. Coaches should therefore seek to moderate their perceptions of an athlete's potential, by at least considering the athletes maturity in reference to other age matched athletes.

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Table 1. Anthropometric variables for each of the different maturational groups (mean ± standard deviation).

	Maturational Status		
	Late	Average	Early
Height (m)	1.71 ± 0.05	1.78 ± 0.05	1.86 ± 0.05
Sitting Height (m)	0.85 ± 0.02	0.91 ± 0.02	0.96 ± 0.02
Weight (kg)	59.54 ± 5.65	68.15 ± 7.04	76.68 ± 7.78

Figure 1. Proportional breakdown (%) of each maturational group and the coaches' perceptions of the athlete's potential.