An Australian perspective on talent identification and development in soccer

A thesis submitted for the degree of Doctor of Philosophy (Sport and Exercise)
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Certificate of original authorship

I, Kyle James Madden Bennett declare that this thesis, is submitted in fulfilment of the
requirements for the award of Doctor of Philosophy (Sport and Exercise), in the Faculty
of Health at the University of Technology Sydney. This thesis is wholly my own work
unless otherwise referenced or acknowledged. In addition, I certify that all information
sources and literature used is indicated in the thesis. This document has not been
submitted for qualifications at any other academic institution. This research is supported
by the Australian Government Research Training Program.

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07/02/2018
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To my beautiful wife, thank you for your love and unwavering support throughout this long process. Thank you for distracting me with your ridiculous, but oh so addictive, television shows. I appreciate the patience you have shown me over my many years at university. I know you have now waited eight and a half years for me to finally get a full-time job, so I guess I could start looking.

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Finally, thank you to all the research assistants, especially Rhys and Jade, who were pivotal to this thesis coming together. Without your dedication to my research, this thesis would not be possible.
Preface

The current thesis presents a collective body of studies that are published or under-review in scientific journals. Study one and two are accepted published in Science and Medicine in Football. Study three is accepted and published in Journal of Science and Medicine in Sport. Study four and five are currently in preparation for journal submission. This thesis contains a general introduction that details the state of talent identification and development research and states the key objectives for each study (chapter one). A literature review is included to provide a comprehensive overview of commonly talent identification and development measures (chapter two). The main body of research is presented in chapters’ three to seven, in the form of one narrative review, and four original investigations. The general discussion provides an interpretation of the studies from a practical standpoint and details clear implications for researchers, coaches, and sporting professionals working in the talent identification and development field. The final section of this thesis is a summary of the major findings along with a guide to areas which researchers can further investigate. This thesis adopted the American Psychological Association 6th edition referencing style. All references are included in the reference list at the end of the thesis.
List of publications

Peer-reviewed journal articles


Conference proceedings

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## Statement of author contribution

The valuable contribution of each author to the studies submitted as part of this thesis (Table I).

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List of abbreviations and symbols

& And
Δ Change in
= Equals
> Greater than
< Less than
× Multiplied by
% Percentage
± Plus-minus sign
AUD Australian dollars
cm Centimetres
DMGT Differentiated Model of Giftedness and Talent
e.g. For example
ES Effect size
F F statistic
FIFA Fédération Internationale de Football Association
h Hour(s)
ICC Intraclass correlation coefficient
i.e. That is
KTK Körperkoordinationstest für Kinder
MANOVA Multivariate analysis of variance
m Metres
m² Metres squared
n Number
NSW New South Wales
<table>
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<tr>
<td>$p$</td>
<td>P value</td>
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<tr>
<td>$\eta_p^2$</td>
<td>Partial eta squared effect size</td>
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<tr>
<td>RM-MANOVA</td>
<td>Repeated measure multivariate analysis of variance</td>
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<tr>
<td>$s$</td>
<td>Seconds</td>
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<tr>
<td>SD</td>
<td>Standard deviation</td>
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<tr>
<td>UEFA</td>
<td>Union of European Football Associations</td>
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<td>USD</td>
<td>United States dollars</td>
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<td>vs.</td>
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Abstract

Association football (soccer) is one of the most popular sports discussed in talent identification and development research. However, discrepancies exist in how researchers, coaches, and sporting professionals (i.e. scouts, recruiters, and skill acquisition specialists) define optimal practice. These discrepancies arise from several gaps in the current research. First, the different talent identification and development demands of established (e.g. Belgium, Germany, and England) and emerging (e.g. Australia, Iceland, and Panama) football nations are overlooked. Notably, nations competing for the same international success can vary in the size and depth of their talent pool, availability of financial and logistical resources for youth development, and the accessibility of systematic training environments. With a strong focus in most research placed on established football nations and limited evidence supporting the effectiveness of their approaches to talent identification, future research is needed to understand the implications of mirroring such practice in emerging football nations. Second, there is a lack of task representative assessments that measure soccer-specific and perceptual-cognitive skills. Consequently, coaches and sporting professionals’ recruitment decisions are primarily based off their subjective opinions of a player’s future playing potential, which biological maturation and relative age effects inherently confound. Finally, it is suggested that confounders that are difficult to operationalise with single output measures (e.g. sporting participation history) may have a significant impact on talent identification.

The present thesis aimed to address these issues through a series of five studies. Study one was a narrative review that analysed the current trends in talent identification and development research. Selection biases were apparent in established football nations,
with high-level development programs favouring players who were either more biologically mature, relatively older, or possessed early performance superiorities. Due to a lack of data on the benefits of the current approaches to talent identification, it was difficult to evaluate whether emerging football nations should simply adopt a similar approach to established football nations or develop their own. As a result, study one highlighted a framework that could assist emerging football nations. The three key areas that emerging football nations should focus on were: (1) preventing active deselection and dropout to maximise the size of the talent pool, (2) mitigating confounding factors, and (3) longitudinally tracking players’ developmental trajectories. These strategies will likely help to reduce the talent identification demand and improve the depth of the talent pool.

Study two examined the use of small-sided games as a soccer-specific skills assessment for talent identification. Seventy-three high and low-level male youth soccer players (age = 13.3 ± 1.2 y) completed small-sided games (playing numbers = 4 vs. 4 and field dimensions = 30 × 20 m) under two conditions (condition 1 = 5 bouts of 3 min and condition 2 = 3 bouts of 5 min). Skill proficiency was measured using retrospective video analysis and recorded as the total number of completed involvements relative to the amount attempted. Small-sided games successfully discriminated playing levels (F = 3.19, p < 0.01, ηp² = 0.98), with high-level players displaying significantly greater passing and controlling the ball proficiency, when compared with low-level players. The high-level players also had a greater total skill proficiency than their low-level counterparts (F = 21.51, p < 0.01, ηp² = 0.29). These results show that small-sided games provided a task representative measure of soccer-specific skills and are a useful inclusion in talent
identification assessments. However, there practical significance still warrants further investigation.

Study three investigated the construct and discriminant validity of a practical video-based decision-making assessment for talent identification. Three-hundred and twenty-eight soccer players (age = 13.0 ± 2.1 y) and 59 youth athletes (age = 14.3 ± 1.2 y) from three developmental stages (late childhood, early adolescence, and mid-adolescence) completed a video-based decision-making assessment. Players were shown 30 attacking situations (2 vs. 1 = 4, 3 vs. 1 = 9, 3 vs. 2 = 6, 4 vs. 3 = 5, and 5 vs. 3 = 6) and were instructed to select the interactive response (i.e. dribble, pass, or shoot) that would directly lead to a goal scoring opportunity. Response accuracy and time were recorded for all situations. The video-based decision-making assessment showed some construct validity, with faster response times in early and mid-adolescent soccer players when compared with the late childhood group (F = 4.05, p < 0.01, $\eta_p^2 = 0.03$). Overall, there was a decline in decision-making performance (i.e. decrease in response accuracy and increase in response time) when the situations contained more participating players (F = 26.16, p < 0.01, $\eta_p^2 = 0.43$). The video-based decision-making assessment lacked discriminant validity for talent identification, as there were minimal differences between academies for response accuracy and response time. Only response accuracy was able to discriminate youth academy soccer players from the control group to some extent (early adolescence: F = 5.28, p < 0.001, $\eta_p^2 = 0.09$ and mid-adolescence: F = 8.14, p < 0.01, $\eta_p^2 = 0.16$). It is suggested that coaches and sporting professionals apply caution when interpreting data from practical, video-based decision-making assessments. There is currently limited evidence supporting the effectiveness of these assessments for talent identification.
Study four detailed preliminary evidence for the influence of youth soccer players’ sporting participation history on their performance characteristics. One hundred and four youth soccer players (age = 13.8 ± 1.2 y) completed anthropometry (stature, sitting height, and body mass), motor competence (balancing backwards, moving sideways, and jumping sideways), and physical fitness assessments (lower body muscular power, linear speed, change of direction skill, and intermittent aerobic endurance), along with a participation history questionnaire (start age in competitive soccer, total volume of soccer-specific practice, total volume of peer-led play, number of other sports, and total hours in other sports). An association was identified for superior motor competence and an earlier start age in competitive soccer (F = 4.17, p = 0.01, \eta_p^2 = 0.11), a higher total volume of soccer-specific practice (F = 3.31, p = 0.02, \eta_p^2 = 0.09), and a higher total volume of peer-led play (F = 3.76, p = 0.01, \eta_p^2 = 0.10). Whereas, superior physical fitness was related to less participation in other sports (F = 2.50, p = 0.04, \eta_p^2 = 0.17). Study four provides preliminary evidence for the inclusion of sporting participation history as a confounder in the talent identification and development process. Specifically, coaches and sporting professionals who use motor competence and physical fitness measures to inform selection decisions should consider the implications of different developmental pathways.

Study five examined the performance characteristics that discriminate academy status in youth Australian soccer. Seventy-four early and mid-adolescent academy soccer players (age = 13.0 ± 0.6 and 15.0 ± 0.6 y, respectively) completed multifactorial assessments of anthropometry, motor competence, physical fitness, decision-making (study three’s assessment), and psychological traits (Task and Ego Orientation in Sport questionnaire). A stepwise discriminant analysis successfully classified early and mid-adolescent soccer
players into their academies with an accuracy of 76.9 and 85.2%, respectively. The key indicators of a higher academy status in early adolescence were body mass, dynamic balancing ability, linear sprint speed, and change of direction skill. Whereas, in mid-adolescence the key indicators of a higher academy status were dynamic balancing ability, linear sprint speed, 3 vs. 1 response accuracy, and 3 vs. 1 response time. Study five’s findings indicate a potential selection bias in the Australian youth soccer talent pool. Players in the high-level academy were grouped according to superior physical fitness measures. Whereas, players outside the high-level academy display slightly better decision-making skills in 3 vs. 1 situations. To maximise the size and the depth of the talent pool in Australia, coaches and sporting professionals should minimise any potential playing level differences that are of a physical nature.

Overall, the current thesis used Australia as a practical example of an emerging nation to create strategies that can assist with talent identification and development. It is recommended that small-sided games are included in multifactorial assessment batteries to provide a task representative measure of soccer-specific skills. However, practical perceptual-cognitive assessments that utilise a non-specific response action are advised against, as the data is not representative of the perceptual-cognitive skills required for soccer expertise. Coaches and sporting professionals should include longitudinal measures of sporting participation history alongside traditional confounders such as biological maturation and relative age effects. Adopting this approach will assist with reducing playing level differences that are based purely on physical prowess and encourage a shift towards selecting players who are gifted in other performance domains (e.g. soccer-specific skills and perceptual-cognitive skills).
Keywords: expertise; football; motor competence; perceptual-cognitive skills; physical fitness; psychological traits; soccer-specific skills; sporting participation history; team sports; youth.