
Junior Athlete Development in Professional Australian Football: Physical Profiling, Match Analysis and Training to Improve Performance

by

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Certificate of Original Authorship

I, Stephen Kelly declare that this thesis is submitted in fulfillment of the requirements for the award of Doctor of Philosophy, in the Faculty of Health at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise reference or acknowledged. In addition, I certify that all information sources and literature used are 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 and Australian Postgraduate Award scholarship.

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Stephen James Kelly

2019

Date

PREFACE

This thesis is written as per the requirements of the degree Doctor of Philosophy and published according to the UTS “Thesis presentation and submission” guidelines. The manuscripts included in this thesis are logically progressive in nature and form a body of work that encompasses the investigation of the elite-junior athlete development within Australian Football.

The data collected during this candidature and associated research has resulted in two manuscripts being accepted for publication while a further three manuscripts are currently under review at peer-reviewed journals. The Introduction section provides a brief background of the literature, defines the research problem and outlines the aim and purpose of each study. The Literature Review provides a synopsis of the currently available literature describing athlete profiling in the context of anthropometric, physical and match-play activity characteristics. The subsequent five chapters encompass the manuscripts which are presented in a logical sequence that specifically address the research problems outlined in the introduction. For these chapters, the figures, tables and referencing format remains according to the specific journal guidelines. Each manuscript in Chapter Three to Chapter Seven outlines an introduction to the specific research problem, individual methodology, results and discussion. The final chapter, general discussion chapter provides a synopsis of the main findings from the various manuscripts. Additionally, the research contributions, practical applications, directions for future research and research conclusions are provided to exemplify the real-world relevance for coaches, recruiters, sport scientists and performance analysts. With the exception of the journal manuscripts, the APA 6th reference style has been used throughout the document and the reference list is located at the end of the thesis.

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ABSTRACT

Australian Football is a field sport encompassing physical and technical skill elements. The physical and activity profiles of elite and sub-elite players have been described previously, however few studies have investigated elite-junior players. This thesis applies five study designs to profile the anthropometric, physical, activity and technical profiles across three competition tiers. *Study One* profiles and compares characteristics of elite-junior and professional players, finding progressive differences across the tiers. *Study Two* describes and compares the match-play activity profiles of elite-junior, sub-elite and elite players, finding an increase in match-play intensity across the tiers. *Study Three* describes and compares the characteristics of selected and non-selected elite-junior players, and suggests that sub-elite competitions provide a viable match-play pathway to develop elite-junior players. *Study Four* describes the characteristics of first-year players during the pre-season period, demonstrating increases to strength and power during an initial development period. *Study Five* examines the positive influence of a 12-week resistance training intervention on the strength and power characteristics of elite-junior players, compared to undertaking skills training alone. Together, these findings can influence and direct the training and match-play practices of elite-junior athletes, with the aim of optimally preparing and transitioning players to elite competition tiers.

KEYWORDS

Activity profiles
Athlete development pathway
Anthropometric profile
Australian football
Elite athlete
Elite-junior athlete
Energy cost
Global positioning systems
High speed running
Lower body strength and power
Muscular strength,
Neuromuscular power
Physical profiling
Pre-season
Selected junior players
Sub-elite athlete
Upper-body strength and power

LIST OF ABBREVIATIONS

AFL – Australian Football League

GPS – Global positioning systems

HR_{max} – Maximum heart rate

HSR – High-speed running

Hz – Hertz

Kilometer – km

kg – kilogram

km·h⁻¹ – kilometers per hour

kJ·kg⁻¹ – kilojoules per kilogram

kJ – kilojoule

Meter – m

m·min⁻¹ – metre per minute

m·s⁻² – metre per second squared (acceleration)

NEAFL – North East National Football League

n·min⁻¹ – efforts per minute

RAE – Relative age effect

RPE – Rating of perceived exertion

VO₂max – Maximum oxygen consumption

TDE – Talent development

TID –Talent identification

TMA – Time motion analysis

VFL – Victorian football league

WAFL – Western Australian football league

W·kg⁻¹·min⁻¹ – watts per kilogram per minute

Yo-Yo IR test – Yo-Yo intermittent recover test

%·min⁻¹ – percentage of time spent per minute