CURRENT TRENDS IN BIOLOGICAL MATURITY AND TRAINING LOAD MONITORING IN ELITE ENGLISH ADOLESCENT SOCCER

Salter, J.[1], De Ste Croix, M.B.A[2], Hughes, J.D.[2], Weston, M.[3] and Towlson, C.[4]

[1]School of Sport, York St John University, York, UK

[2]School of Sport and Exercise, University of Gloucestershire, Gloucester, UK

[3]Department of Psychology, Sport and Exercise, School of Social Sciences, Humanities and Law, Teesside University, Middlesbrough, UK

[4]School of Life Sciences, Sport, Health and Exercise Science. The University of Hull, Hull, UK

@jay_salter

UNIVERSITY OF GLOUCESTERSHIRE

EUROPEAN COLLEGE of SPORT SCIENCE ECSS

23rd annual Congress of the

EUROPEAN COLLEGE OF SPORT SCIENCE

SPORT SCIENCE AT THE CUTTING EDGE

4th - 7th July 2018, Dublin - Ireland

Hosted by: University College Dublin & Ulster University

ECSS DUBLIN 2018

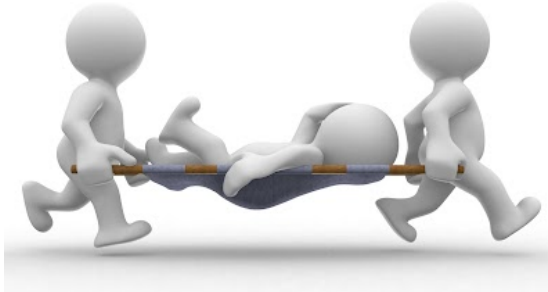
York St John University

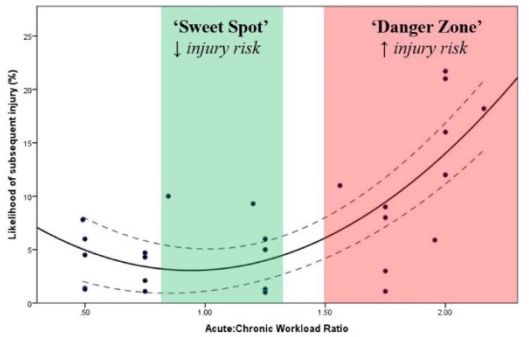
Rationale

The negative consequences associated with sports injury have been widely researched (Ekstrand, Walden & Hagglund, 2017)

Although consequences of injury during adolescence are less obvious to sports clubs, these can have potentially catastrophic implications for long term development and (de)selection (Myer et al, 2015)

Most injuries within adolescent football are non-contact and soft tissue in nature, potentially linked to sub-optimal training loads (Read et al, 2017; Renshaw & Goodwin, 2016; Tears et al, 2018)





Windt & Gabbett, 2016

Rationale

EPPP (2012) and FA Women's Talent Pathway (2016) provide recommended standards for multifaceted components of player development, and adherence to this used to classify academies (Category 1-4)

Non-prescriptive and open to interpretation which may influence the consistency and therefore the quality of monitoring strategies that are employed

'188.2 anthropometric assessments' and '188.7. monitoring of physical exertion' [Category 1 academies only]
(EPPP,2012)

Varied methods of estimating biological maturity and monitoring training load currently employed, each with its own logistical, systematic and resource based limitations (Mills et al, 2016)

Aim

Establish and compare current approaches and perceived barriers of academy practitioners to estimating biological maturity and training load monitoring within UK academies

Methodological Approach

A cross-sectional sample of staff from EPPP and RTC academies between Aug and Dec on the 2017/18 season was conducted

Content validity was reviewed via local communications between the research team and applied practitioners (n = 5) and academics in subject area (n = 4)

Two concepts included in the final survey were:

1. *Monitoring of biological maturity (2 unipolar agreement and 6 multiple choice questions)*
2. *Training load monitoring (2 unipolar agreement and 6 multiple choice questions)*

Two Eligibility questions prevented duplications and ensured construct validity:

1. *Have you already completed this survey (Yes or No)*
2. *Are you currently working with academy players within an EPPP or RTC setting? (EPPP, RTC or No)*

Demographic data was collected on the first page: *professional league of their club, academy category rating, job role, employment status and phase (FP,YDP or PDP) predominantly worked with*

Data Analysis

Multiple choice questions

Between-academy proportion differences for multiple choice questions were calculated, with 90% confidence limits to express uncertainty and interpreted using standardised scales (Hopkins, 2010)

A conservative approach was adopted, whereby only a *moderate* or higher between-academy difference was reported.

**Comparisons were not possible where zero responses were received for an item.*

Unipolar agreement questions

Unipolar scaled responses were presented as mean ± SD and then divided into importance groups based on the 25th, 50.th and 75th centiles (< 25th *low*; >25th to 50th, *moderately low*; >50th to 75th *moderately high*; >75th *high*), purely for interpretation through a distribution approach

A *clear* meaningful difference threshold of 10% was used against the a standardised scale (Hopkins, 2009) and a conservative approach was adopted whereby a clear effect was only declared when the between-group CL did not overlap both positive and negative thresholds by 5% (Hopkins, 2009)

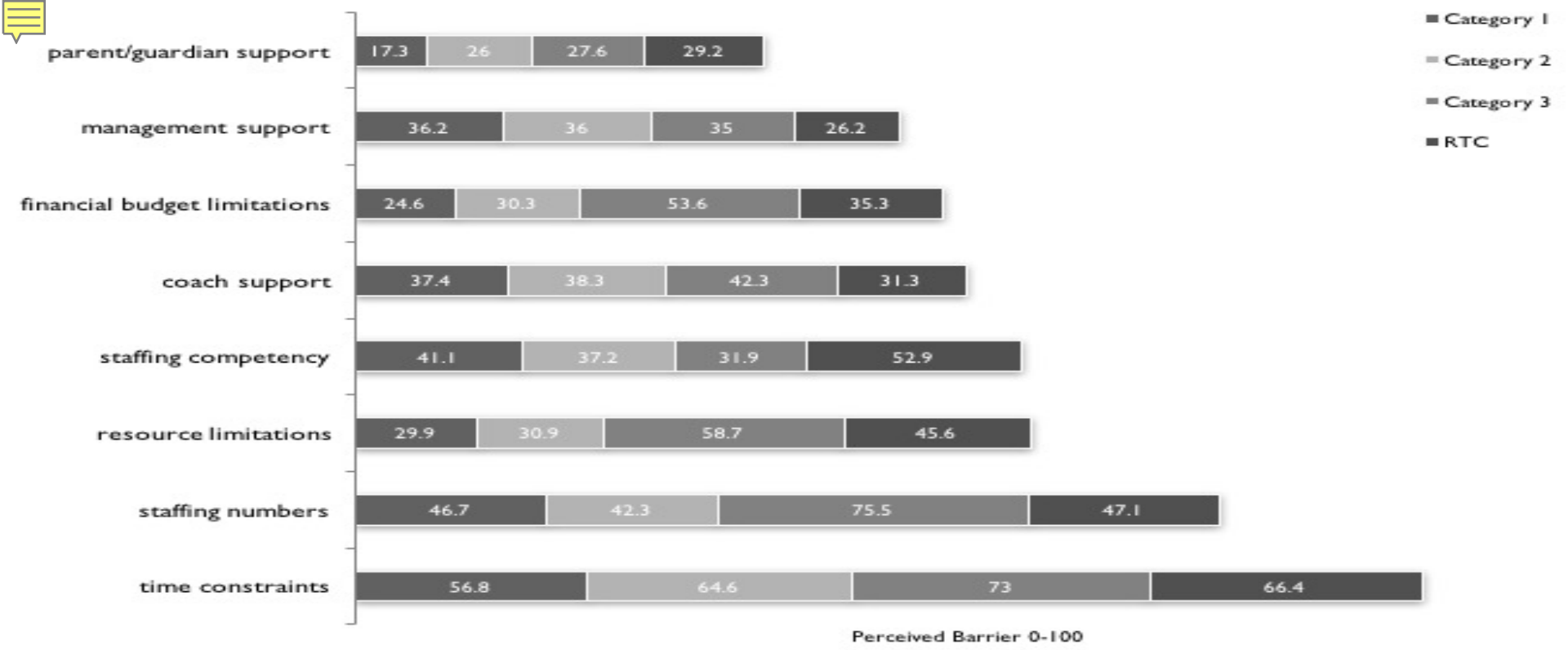


Figure 2. Perceived barriers to biological maturity monitoring

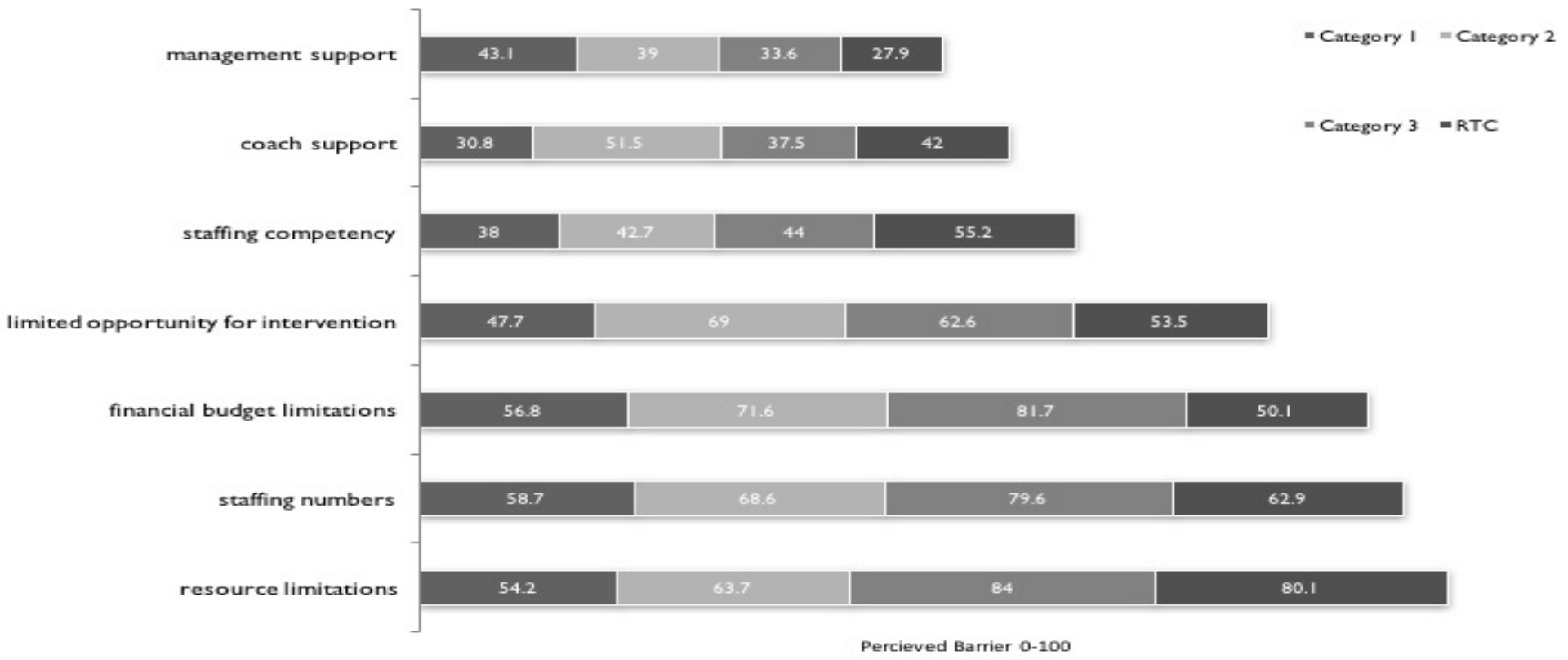


Figure 4. Perceived barriers to training load monitoring

Question and Responses	C1	C2	C3	RTC	Qualitative Inference
Which approach is primarily adopted for estimating biological maturity?					
Prediction of adult height	9 (60)	1 (8)	6 (60)	5 (46)	***Very Large** C1vC2*
Maturity offset	5 (33)	12 (92)	3 (30)	3 (27)	***Large**: C1vC2*
Skeletal maturity	0 (0)	0 (0)	0 (0)	2 (18)	
Other	1 (7)	0 (0)	1 (10)	1 (9)	
Who is primarily responsible for collecting biological maturation data?					
Medical staff	1 (7)	2 (15)	0 (0)	3 (28)	***Large**: C1vC2, C1vRTC*
Sport Science support staff	14 (93)	11 (85)	8 (80)	8 (72)	
Other	0 (0)	0 (0)	2 (20)	0 (0)	
**Who is biological maturity data reported to?*					
Academy manager	10 (67)	8 (62)	7 (70)	6 (55)	
Lead age group coach	12 (80)	12 (92)	8 (80)	9 (82)	
Age group coaches	14 (93)	10 (77)	7 (70)	9 (82)	
Medical staff	15 (100)	11 (85)	9 (90)	9 (82)	
Sport Science support staff	14 (93)	12 (92)	9 (90)	9 (82)	
Intern/student	2 (13)	6 (46)	2 (20)	2 (18)	***Moderate**: C1vC3; **Large**: C1vC2*
Player	7 (47)	5 (39)	5 (50)	7 (64)	
Parent/guardian	1 (7)	5 (39)	4 (40)	9 (82)	***Very large**: C1vC2, C1vC3; **Extremely Large**: C1vRT*
How frequently are biological maturation estimations conducted?					
Annually	0 (0)	0 (0)	1 (10)	0 (0)	
Monthly	3 (20)	5 (39)	2 (20)	1 (9)	***Moderate**: C1vC2, **Large**: C1vRTC*
Quarterly	11 (73)	5 (39)	6 (60)	6 (55)	***Moderate**: C1vC2*
Six-monthly	0 (0)	0 (0)	1 (10)	3 (27)	
Other	1 (7)	2 (23)	0 (0)	1 (9)	***Large**: C1vC2*
What is the primary method of feedback on biological maturation estimations?					
Infographic	1 (7)	0 (0)	0 (0)	0 (0)	
Verbal communication	1 (7)	2 (15)	1 (10)	8 (73)	***Large**: C1vC2; **Very Large**: C1vRTC*
Visual presentation	9 (60)	8 (62)	6 (60)	2 (18)	***Very Large**: C1vRTC*
Written report	4 (27)	3 (23)	3 (30)	1 (9)	***Large**: C1vRTC*
**When using biological maturity to group players, what activities is this for?*					
Pitch-based sessions	8 (25)	8 (29)	4 (25)	2 (25)	***Large :** C1vRTC*
Gym-based sessions	7 (22)	8 (29)	4 (25)	4 (50)	
Recovery sessions	0 (0)	0 (0)	0 (0)	1 (12.5)	
Competitive fixtures	5 (16)	2 (7)	1 (6)	0 (0)	***Large**: C1vC2; **Very Large**: C1vC3*
Ad-hoc fixtures	7 (22)	6 (21)	3 (19)	1 (12.5)	***Moderate**: C1vC3; **Very Large**: C1vRTC*
Specific fixtures	5 (16)	4 (14)	4 (25)	0 (0)	

Table 2. Responses (%) and qualitative inferences for biological maturity estimations

Maturity Key Findings

- There were large to very large differences in maturity estimations used – both have errors and should be used with caution
- Sport Science support staff were predominantly responsible, although some shared responsibility
- Maturity data very rarely provided to parents in C1 clubs – '*autonomy thwarting*'
- Bio-banding was considered of moderately low importance – outlines infancy of contest

Training Load Key Findings

- Category 1 academies tend to use GPS (external load) monitoring more often
- A larger proportion of academies monitor load through customised spread sheets rather than league standard PMA
- Almost exclusively no medical staff were routinely presented training load data
- Higher ranked academies report data more frequently – although perceived moderately low importance for prescription

Question and Responses	C1	C2	C3	RTC	Qualitative Inference
What is the primary approach to training load monitoring?					
GPS devices	7 (47)	4 (31)	0 (0)	0 (0)	***Moderate**: C1vC2*
Rating of Perceived Exertion	6 (40)	3 (23)	7 (70)	8 (73)	***Moderate**: C1vC2, C1vC3, C1vRTC*
Physiological (TRIMP)	1 (7)	0 (0)	0 (0)	0 (0)	
Coach perceptions	1 (7)	4 (31)	2 (20)	1 (9)	***Large**: C1vC2, C1vC3*
Support staff perceptions	0 (0)	0 (0)	1 (10)	0 (0)	
Wellness data	0 (0)	0 (0)	0 (0)	2 (18)	
Verbal discussion	0 (0)	2 (15)	0 (0)	0 (0)	
How is your training load data compiled?					
PMA	4 (27)	4 (31)	5 (50)	0 (0)	***Moderate**: C1vRTC*
Customised spreadsheet	9 (60)	8 (62)	3 (30)	9 (82)	***Large**: C1vC3*
Monitoring application	1 (7)	0 (0)	0 (0)	1 (9)	
Other	1 (7)	1 (8)	2 (20)	1 (9)	***Large**: C1vC3*
Who is primarily responsible for collating training load data?					
Academy manager	0 (0)	0 (0)	1 (10)	0 (0)	
Lead age group coach	0 (0)	1 (7)	1 (10)	1 (9)	
Age group coaches	0 (0)	1 (7)	0 (0)	1 (9)	
Medical staff	0 (0)	1 (7)	1 (10)	2 (18)	
Sport Sciences support staff	14 (93)	9 (69)	7 (70)	6 (55)	***Moderate**: C1vRTC*
Intern/student	1 (7)	1 (7)	0 (0)	1 (9)	
Players	0 (0)	0 (0)	0 (0)	0 (0)	
Who is training load data reported to?					
Academy manager	0 (0)	0 (0)	2 (20)	3 (27)	
Lead age group coach	4 (27)	8 (62)	2 (20)	0 (0)	
Age group coach	8 (53)	1 (8)	2 (20)	4 (36)	***Moderate**: C1vRTC; **Large**: C1vC3; **Very Large**: C1vC2*
Medical Staff	0 (0)	0 (0)	0 (0)	1 (9)	
Sport Science support staff	1 (7)	2 (15)	1 (10)	0 (0)	
Player	1 (7)	1 (8)	0 (0)	1 (9)	
Other	1 (7)	1 (8)	3 (30)	2 (18)	
**How is training load data reported?*					
Infographic	3 (13)	2 (11)	1 (7)	1 (8)	***Moderate**: C1vC3*
Verbal communication	6 (26)	3 (17)	4 (29)	3 (23)	***Moderate**: C1vC2, C1vRTC*
Visual presentation	10 (44)	8 (44)	5 (36)	8 (62)	
Written report	5 (22)	5 (28)	4 (29)	1 (8)	***Large**: C1vRTC*
How frequently are training load reports compiled?					
Daily	9 (60)	6 (46)	2 (20)	2 (18)	***Large**: C1vC3; **Very Large**: C1vRTC*
Weekly	5 (33)	2 (15)	2 (20)	5 (46)	***Moderate**: C1vC3; **Large**: C1vC2*
Monthly	0 (0)	1 (8)	1 (10)	1 (9)	
Quarterly	0 (0)	0 (0)	0 (0)	2 (18)	
Bi-annually	0 (0)	0 (0)	1 (10)	0 (0)	
Annually	1 (7)	0 (0)	1 (10)	0 (0)	
Other	0 (0)	4 (31)	3 (30)	1 (9)	

Table 3. Responses (%) and qualitative inferences for training load monitoring

Practical Applications

- Reliability of maturity methods – coaches must consider the error and limitations associated with estimations as they are crucial to long-term development
- Transparency of data – involving all stakeholders (coaches, medical staff, players and parents) may facilitate a better environment for managing load to a group and individual level
- Designate responsibility for monitoring – this will ensure quality, consistency and most importantly impact on the long-term development of adolescent players
- Although there is extensive literature on the associations between injury and load within adult populations, further research is needed to enhance long-term development

Any questions?

@jay_salter