The World Congress on Science and Football 2015 focuses on five codes of football: Soccer, Rugby, and Australian, American and Gaelic Football.

The congress brings together international scientists and practitioners to exchange knowledge and participate in a dialogue on both mono- and multidisciplinary aspects of football. The congress gathers scientists from the natural, human and social sciences and highlights the newest research results, methodologies and applied approaches.

The scientific program includes plenary sessions, invited symposia, free oral presentations, workshops and poster exhibition and presentations within themes like Testing and training, Match analysis, Team cohesion and teambuilding, Globalisation of modern football, Football for health - prevention, treatment and rehabilitation, Women’s football, Fan culture, Environmental factors as well as Football medicine.

The conference is hosted by
University of Copenhagen and Copenhagen Centre for Team Sport and Health, Department for Nutrition, Exercise and Sports, University of Copenhagen

The conference is financially supported by
The Ministry of Culture’s Research Committee

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University of Copenhagen and Copenhagen Centre for Team Sport and Health, Department for Nutrition, Exercise and Sports, University of Copenhagen

The conference is financially supported by
The Ministry of Culture’s Research Committee

W C S F
2 0 1 5
C O P E N H A G E N
8TH WORLD CONGRESS ON
SCIENCE & FOOTBALL

PROGRAM AND
ABSTRACTS

20-23 May 2015
in Copenhagen Denmark
www.wcsf2015.ku.dk
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WELCOME FROM THE ORGANIZERS

The 8th World Congress on Science and Football is about to kick off. We are honored and proud to be hosting the congress and would like to welcome you all to Copenhagen for the event. We are delighted to have representatives from all continents.

We believe we have developed a unique program that will bring you right up to date when it comes to science in football.

There will be 218 spoken presentations and almost 150 posters. There will be 440 delegates from 46 countries.

Your contribution will be crucial to the success of the congress, and we hope you will take every opportunity to interact with one another, both during the symposia/workshops and during the breaks. Together we can create a positive, sociable and open atmosphere, and we will do our very best to ensure that everything runs smoothly.

Through various daily football events, we will be adding the dimension of football itself to the scientific program. We hope you will appreciate this and take up the challenge of participating in Football Fitness and the WCSF football tournament.

We warmly welcome all delegates and hope you will enjoy your stay in wonderful Copenhagen and find the congress stimulating and productive.

Jens Bangsbo
Chair of the Scientific Committee

Peter Krstrup
Chair of the Organizing Committee
WELCOME FROM UNIVERSITY OF COPENHAGEN

We are red we are white – we are Danish Dynamite

You never forget your first love. Mine was the 1980s Danish national squad. It was like the dynamite in its slogan. Laudrup’s magical touch. Elkjær’s swaggering acceleration. Olsen, the maestro who set the pace of the game from the rear. Those were some of the players I admired as a teenager and striker for HIK Copenhagen’s girls’ team.

I am not the only Dane who is hooked on the game. While you are in Copenhagen, see if you get a chance to go to “Kløvermarken” or “Fælledparken” and their many football pitches filled with amateur teams in ages ranging from 4 to the 65 years or older who meet the requirements to be “Super Grand Old Masters”. In this way, Copenhagen is a living laboratory for researchers in your field.

The University of Copenhagen has since the start of the last century built a strong research base within exercise physiology and has for more than 25 years conducted research in physiology of ball games, including interval training, fitness testing and in recent years health effects of taking part in team sport. The research environment has grown markedly and is now covering the areas of physiology, medicine, sociology, psychology and history.

The University is proud of hosting WCSF 2015, which not only provides an opportunity to focus on the physiological, technical-tactical and economic aspects of Soccer, Rugby, Australian rules, American Football, Gaelic Football, but also includes sessions on the health effects of football and the latest research within the human and social sciences.

I warmly welcome all delegates and wish you an exciting, friendly and productive congress. I also hope you will get a chance to take a look at our more than 525 year old university and enjoy the wonderful city of Copenhagen – including the new and older generations of dynamite players in action.

Lykke Friis, Pro-rector
University of Copenhagen
ORGANIZATION

Scientific committee
Jens Bangsbo, University of Copenhagen, Denmark (chair)
Mario Bizzini, F-MARC, FIFA, Switzerland
Jan Cabri, Norwegian School of Sport Sciences, Norway
Carlo Castagna, Technical Department of the Italian Football Association, Italy
Brian Dawson, University of Western Australia, Australia
Barry Drust, Liverpool John More University, United Kingdom
Anne-Marie Elbe, University of Copenhagen, Denmark
Kari Fasting, Norwegian School of Sports Sciences, Norway
Peter Riis Hansen, Gentofte Hospital, Denmark
Per Hölmich, Copenhagen University Hospital, Denmark
Maria Kavussanu, University of Birmingham, United Kingdom
Peter Krstrup, University of Copenhagen, Denmark
Joseph Maguire, Loughborough University, United Kingdom
Tim Meyer, Saarland University, Germany
Hiroyuki Nunome, Nagoya University, Japan
Donna O’Connor, University of Sydney, Australia
Laila Ottesen, University of Copenhagen, Denmark
Gertrud Pfister, University of Copenhagen, Denmark
Albrecht Sonntag, ESSCA School of Management, France
Natalia Stambulova, Halmstad University, Sweden
Per Aagaard, University of Southern Denmark, Denmark

Organizing committee
Peter Krstrup, University of Copenhagen (chair)
Mie Bendtsen, Anne Lykke Poulsen, Søren Bennike, Glen Nielsen, Knud Ryom, Morten Randers
Thomsen, University of Copenhagen

Congress secretariat
ICS - International Conference Services
P.O. Box 41, Strandvejen 169-171
DK-2900 Hellerup, Copenhagen, Denmark
Tel: +45 7023 7823
E-mail: reservations@ics.dk
<table>
<thead>
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<tr>
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<td>Oral Sessions 17 - 21</td>
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<td>17:15</td>
<td>17:30 Street Soccer for Homeless at City Hall Square</td>
<td>Workshop 6</td>
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<td>17:30</td>
<td>Football Tournaments</td>
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<td>Oral Sessions 36 - 39</td>
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<td>19:00</td>
<td>18:30 Welcome Reception at City Hall</td>
<td>19:30 – 24:00 Congress Dinner</td>
<td>19:30 – 24:00 Congress Dinner</td>
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<td>20:00</td>
<td>Boat Trip</td>
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<td>21:30</td>
<td>Young Scholars Event – Local Beer Tasting</td>
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ORAL AND POSTER SESSIONS

WEDNESDAY, 20 MAY 2015
13:15 - 14:15 KP01 - Keynote Plenum

15:45 - 17:30 S01 - Injuries - Part I
               S02 - Match analysis - Part I
               S03 - Testing - Part I
               S04 - Sport sociology
               S05 - Injuries - psychological perspectives

THURSDAY, 21 MAY 2015
09:00 - 10:00 W01 - Fitness training and testing of the top player
               W02 - Prevention of contact and non-contact injuries in football
               W03 - Nutrition and supplementation in football
               S06 - Health - Part I
               S07 - Health - from a social science perspective

10:15 - 11:45 S08 - Australian football
               S09 - Match analysis - Part II
               S10 - Biomechanics
               S11 - Fatigue - Part I
               S12 - General psychology - Part I

12:00 - 13:00 S13 - Health - psychological perspective
               S14 - Organization, economics and politics - Part I

12:00 - 13:00 Poster Session I
               P01 - Biomechanics, Women & Nutrition and supplementation
               P02 - Children
               P03 - Fatigue
               P04 - Health - prevention, treatment & rehabilitation
               P05 - Varia - Fatigue, match analysis & injuries

13:45 - 14:15 KP02 - Keynote Plenum

14:30 - 15:30 S15 - Coaches - situations and careers - Part I
               S16 - Career pathways and talent development - Part I
14:30 - 15:30  Poster Session II  
P06 - Match analysis - Part I  
P07 – Injuries  
P08 - Testing - Part I  
P09 - Training - Part I  

15:45 - 17:15  S17 - Training - Part I  
S18 - Children  
S19 - Rugby  
S20 - Pedagogical issues  
S21 - Organization, economics and politics - Part II  

FRIDAY, 22 MAY 2015  
09:00 - 10:15  W04 - Australian football rules  
W05 - Fitness coaching in an elite football team - with special focus on individual-based approach  
S22 - Injury prevention  
S23 - A multi-disciplinary examination of football development and performance  
S24 - Football fans  

10:30 - 11:45  S25 - Environment  
S26 - Training - Part II  
S27 - Health - Part II  
S28 - Match analysis - Part III  
S29 - Career pathways and talent development - Part II  

12:00 - 13:00  S30 - Sport history. Politics and policies - a historical perspective  

12:00 - 13:00  Poster Session III  
P10 - Match analysis - Part II  
P11 - Testing - Part II  
P12 - Training - Part II  
P13 - Varia - Sports medicine  

13:45 - 14:15  KP03 - Keynote Plenum  

14:30 - 15:30  Poster Session IV  
P14 - Psychological performance issues  
P15 - Women's football  
P16 - Psychology  
P17 - Pedagogical issues, Coaches and team process  
P18 - Varia - Social science and humanities
### PROGRAM OVERVIEW

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<thead>
<tr>
<th>Time</th>
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<tr>
<td>15:45 - 17:00</td>
<td>S31 - Training - Part II</td>
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<td>S32 - Women's football</td>
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<td>S33 - Gaelic football</td>
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<td>S34 - Women's football</td>
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<td>S35 - Coaches - situations and careers Part II</td>
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<td>17:15 - 18:15</td>
<td>W06 - Association football referee training and performance</td>
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<td>S36 - Injuries - Part II</td>
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<td>S37 - Testing - Part II</td>
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<td>S38 - Career pathways and talent development - Part III</td>
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<td>S39 – Morality</td>
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### SATURDAY, 23 MAY 2015

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<td>09:00 - 10:15</td>
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<td>S41 - Fatigue - Part II</td>
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<td>S42 - Training - Part III</td>
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<td>S43 - General psychology - Part II</td>
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<td>S44 - Migration &amp; integration</td>
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<td>10:30 - 12:00</td>
<td>S45 – Meet the Experts</td>
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<td>S46 - Health - Part III</td>
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<td>S47 - General psychology - Part III</td>
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<td>S48 - Referees and scouts</td>
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<td>12:15 - 12:45</td>
<td>Tom Reilly Memorial Lecture</td>
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### MEET THE EXPERTS

**SATURDAY, 23 MAY 2015**

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<th>Time</th>
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<td>10:30 - 12:00</td>
<td>S45 – Meet the Experts</td>
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**Rooms tba**

### MEET THE EXPERTS

**Per Hölmich, Denmark**
- Magni Mohr, Faroe Islands
- Maria Kavussanu (UK)
- Aaron Coutts (Australia)
- Natalia Stambulova (Sweden)

### 11:15 – 12:00

**Kari Fasting (Norway)**
- Tim Meyer (Germany)
- Brian Dawson (Australia)
- Carlo Castagna (Italy)
WORKSHOPS

THURSDAY, 21 MAY 2015

09:00 - 10:00  W01  WORKSHOP  Auditorium 01
Chairs: Bary Drust (UK) & Magni Mohr (Faroe Islands)
Fitness training and testing of the top player
Barry Drust (United Kingdom)

09:00 - 10:00  W02  WORKSHOP  Auditorium 02
Chairs: Per Hölmich (Denmark) & Mario Bizzini (F-MARC, FIFA, Switzerland)
Prevention of contact and non-contact injuries in football
Mario Bizzini (F-MARC, FIFA, Switzerland), A Junge, J Dvorak

09:00 - 10:00  W03  WORKSHOP  Meeting Room 03
Chairs: Terence Favero (USA) & Ronald Maughan (UK)
Nutrition and supplementation in football
Ronald Maughan (UK)

FRIDAY, 22 MAY 2015

09:00 - 10:15  W04  WORKSHOP  Auditorium 01
Chairs: Brian Dawson (Australia) & Aaron Coutts (Australia)
Training and performance characteristics of professional Australian Football
Aaron Coutts (Australia)

09:00 - 10:15  W05  WORKSHOP  Auditorium 02
Chairs: Magni Mohr (Faroe Islands) & Marcello Iaia (Italy)
Fitness coaching in an elite football team - with special focus on individual-based approach
Marcello Iaia (Italy)

17:15 - 18:15  W06  WORKSHOP  Meeting Room 03
Chairs: Morten Randers (Denmark) & Carlo Castagna (Italy)
Association football referee performance and training
Carlo Castagna (Italy)
SCIENTIFIC PROGRAM

WEDNESDAY, 20 MAY 2015

13:00 - 13:15  OPENING CEREMONY  Auditorium 01 + 02
   Jens Bangsbo (Denmark) & Peter Krustrup (Denmark)

13:15 – 14:15  KP01  KEYPNote plenum  Auditorium 01 + 02
   Chairs: Jens Bangsbo (Denmark) & Peter Krustrup (Denmark)

13:15 - 13:30  KP01.1  The 20 years of F-MARC
   Jiri Dvorak (F-MARC, FIFA, Switzerland)

13:30 – 13:45  KP01.2  Playing football to prevent chronic diseases
   Peter Krustrup (Denmark)

13:45 - 14:00  KP01.3  Football and health from a social science perspective
   Laila Ottesen (Denmark)

14:00 – 14:15 Implementation of 11 for health in Denmark - football fitness
   Jesper Møller (Chairman of the Danish Football Association, Denmark)

14:15 - 14:30  Break

14:30 - 15:15  PD  PANEL DISCUSSION  Auditorium 01 + 02
   Chairs: Jens Bangsbo (Denmark) & Peter Krustrup (Denmark)

   Panel: Jiri Dvorak (F-MARC, FIFA), Jo Jewell (WHO), Mogens Kirkeby (International Sport and Culture Association – ISCA), Niels Nygaard (NOC and Sports Confederation of Denmark), Søren Møller (DGI, Danish Sport-for-All Association), Jesper Møller (the Danish Football Association), Peder Bisgaard (The Danish Federation for Company Sports).

15:15 - 15:45  Break

15:45 - 17:30  S01  INJURIES - PART I  Auditorium 01
   Chairs: Per Hölmich (Denmark) & Jan Ekstrand (Sweden)

15:45 - 16:15  S01.1  Injuries in top class football- coaches are more important than doctors?
   Jan Ekstrand (Sweden)

16:15 - 16:30  S01.2  Biceps femoris long head architecture and hamstring injuries in elite soccer
   Ryan Timmins (Australia), M Bourne, A Shield, M Williams, DA Opar

16:30 - 16:45  S01.3  Eccentric hamstring strength and injuries in elite soccer: a prospective study
   David A Opar (Australia), R Timmins, M Bourne, A Shield, M Williams

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16:45 - 17:00  S01.5  Accumulated work loads and injury risk in elite youth football players using GPS technology
Laura Bowen (UK), F-X Li

17:00 - 17:15  S01.6  Is eccentric knee flexor strength prioritised at elite levels of football
Steven Duhig (Australia), M Bourne, DA Opar, A Shield, R Timmins

15:45 - 17:30  S02  MATCH ANALYSIS - PART I  Auditorium 02
Chairs: Magni Mohr (Faroe Islands) & Paul S Bradley (UK)

15:45 - 16:00  S02.1  Physical capacity and match running performance in very young soccer players
Giuseppe Bellistri (Italy), L Sodero, M Ramaglia, C Sforza, M Marzorati, S Porcelli

16:00 - 16:15  S02.2  Capturing team identities in soccer through playing style analysis
Hector Ruiz (UK), P Lisboa, P Neilson, W Gregson

16:15 - 16:30  S02.3  Development of high-precision tracking system for soccer player analysis by using computer vision techniques
Ayano Souma (Japan), K Sakaue, S Ishizaki

16:30 - 16:45  S02.4  Differences in high-intensity running, metabolic power, accelerations and decelerations between football players of high and low performing teams
Ermanno Rampinini (Italy), DR Connolly, M Riggio, A Bosio, R Sassi, AJ Coutts

16:45 - 17:00  S02.5  Influence of Styles of Play on Possession Performance Indicators in Elite Soccer
Javier Fernandez-Navarro (Spain), L Fradua, AA Zubillaga, O Caro, AP McRobert

17:00 - 17:15  S02.6  Pass appearance time and pass attempts by teams qualifying for the second stage of World Cup 2014 in Brazil
Kaori Saito (Japan)

15:45 - 17:30  S03  TESTING - PART I  Meeting Room 03
Chairs: Carlo Castagna (Italy) & Hiro Nunome (Japan)

15:45 - 16:00  S03.1  Are acceleration and jumping related to goalkeeper-specific testing?
Ricardo Rebelo-Gonçalves (Portugal), AJ Figueiredo, J Valente-dos-Santos, MJ Coelho-e-Silva, A Tessitore

16:00 - 16:15  S03.2  Coaches perceived vs. true ranking of physical fitness in U19 youth football players
Michael Rumpf (Qatar)

16:15 - 16:30  S03.3  Comprehensive performance test battery protocol of elite academy soccer players. Prospective and position specific evaluation
David Zalai (Hungary), I Csaki, Z Holanek, S Safar, T Halmai

16:30 - 16:45  S03.4  Expert oriented analysis of football duels by means of position data
Roland Leser (Austria), T Hoch, B Moser, A Baca

16:45 - 17:00  S03.5  Testing modality affects vVO2max assessment in soccer players and long distance runners
Andrea Riboli (Italy), E Limonta, E Cè, M Venturelli, G Alberti, F Esposito
17:00 - 17:15  S03.6  Predictive potential of peak speed and the critical time for recovery  
*Christian Heyde (Germany), H Mahler, A Gollhofer*

17:15 - 17:30  S03.7  Strength and power variation across preseason in school rugby players  
*Barry Horgan (Ireland), DK Collins*

**15:45 - 17:15  S04  SPORT SOCIOLOGY  Meeting Room 04**  
*Chair: Laila Ottesen (Denmark)*

15:45 - 16:15  S04.1  Gaelic football in a sociological perspective  
*John Connolly (Ireland)*

16:15 - 16:45  S04.2  American football and national identity  
*Gerald Gems (USA)*

16:45 - 17:15  S04.3  Sport teams as social entities: tensions and potentials  
*Lars Tore Ronglan (Norway)*

**15:45 - 17:15  S05  INJURIES - PSYCHOLOGICAL PERSPECTIVES  Meeting Room 05**  
*Chair: Urban Johnson (Sweden)*

15:45 - 16:15  S05.1  Perceived stress as a predictor of sport injuries in football: a latent class analysis  
*Urban Johnson (Sweden), A Ivarsson, A Edvardsson*

16:15 - 16:35  S05.2  Psychologically based programs for injury prevention in football: a meta-analysis  
*Andreas Ivarsson (Sweden), U Johnson, A Edvardsson*

16:35 - 16:55  S05.3  Reflections from a sport psychology practitioner on a Swedish psychological injury prevention intervention with young elite football players  
*Arne Edvardsson (Sweden), A Ivarsson, U Johnson*

16:55 - 17:15  S05.4  ‘Perfectly normal’ - a descriptive phenomenological study of the lived experience of injuries acquired during recreational football training in men with prostate cancer undergoing androgen deprivation therapy (The FC Prostate Trial)  
*Julie Midtgaard (Denmark), DM Bruun, J Uth, T Hornstrup, P Krustrup*

17:30 - 18:30  Street soccer. The Danish National Team for homeless practice at the City Hall Square

18:30 - 19:30  Welcome Reception at Copenhagen City Hall

20:00 - 21:00  Boat Trip
## ORAL PROGRAM – THURSDAY, 21 MAY 2015

**THURSDAY, 21 MAY 2015**

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<tr>
<td>09:00 - 10:00</td>
<td>W01</td>
<td>Auditorium 01</td>
<td><strong>WORKSHOP:</strong> Fitness training and testing of the top player</td>
<td><strong>Chairs:</strong> Bary Drust (UK) &amp; Magni Mohr (Faroe Islands)</td>
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<tr>
<td>09:00 - 10:00</td>
<td>W02</td>
<td>Auditorium 02</td>
<td><strong>WORKSHOP</strong> Prevention of contact and non-contact injuries in football</td>
<td><strong>Chairs:</strong> Per Hölmich (Denmark) &amp; Mario Bizzini (F-MARC, FIFA, Switzerland)</td>
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<tr>
<td>09:00 - 10:00</td>
<td>W03</td>
<td>Meeting Room 03</td>
<td><strong>WORKSHOP</strong> Nutrition and supplementation in football</td>
<td><strong>Chairs:</strong> Terence Favero (USA) &amp; Ronald Maughan (UK)</td>
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<td>09:00 - 10:00</td>
<td>S06</td>
<td>Meeting Room 04</td>
<td><strong>HEALTH - PART I</strong></td>
<td><strong>Chairs:</strong> Peter Riis Hansen (Denmark) &amp; Carlo Castagna (Italy)</td>
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<tr>
<td>09:00 - 09:15</td>
<td>S06.1</td>
<td></td>
<td>Case study: nutrition intervention for an international-standard</td>
<td>Scott Robinson (UK), JP Morton, GL Close, D Flower, L Bannock</td>
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<td>09:15 - 09:30</td>
<td>S06.2</td>
<td></td>
<td>Influence of the type of surface on female children football players’ bone mass</td>
<td>Enrique Colino-Acevedo (Spain), E Ubago-Guisado, J Sánchez-Sánchez, J López-Fernández, L Gallardo</td>
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<tr>
<td>09:30 - 09:45</td>
<td>S06.3</td>
<td></td>
<td>Walking football – experiences and outcomes for older players</td>
<td>Peter Reddy (UK), I Dias, I Nagar, C Holland, P Krstrup, L Connolly, H Hubball</td>
</tr>
<tr>
<td>09:45 - 10:00</td>
<td>S06.4</td>
<td></td>
<td>Effects of small-volume football and vibration training on body composition, aerobic fitness and muscular PCr kinetics for inactive women</td>
<td>Luke Connolly (UK), S Scott, M Mohr, G Ermidis, R Julian, J Bangsbo, S Jackman, K Knapp, P Krstrup, J Fulford</td>
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<tr>
<td>09:00 - 10:00</td>
<td>S07</td>
<td>Meeting Room 05</td>
<td><strong>HEALTH - FROM A SOCIAL SCIENCE PERSPECTIVE</strong></td>
<td><strong>Chair:</strong> Gertrud Pfister (Denmark)</td>
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<tr>
<td>09:00 - 09:15</td>
<td>S07.1</td>
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<td>The influence of club football on children's daily physical activity</td>
<td>Glen Nielsen (Denmark), A Bugge, LB Andersen</td>
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<td>09:15 - 09:30</td>
<td>S07.2</td>
<td></td>
<td>Football fitness: 'Healthy, funny and social'? The perspectives of female and male players</td>
<td>Laila Ottesen (Danmark), K Swenningsen, LF Thing</td>
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</tbody>
</table>
09:30 - 09:45  S07.3  “It was all about the boys” - the inclusion of girls in Gaelic football in Irish primary schools
Richard Bowles (Ireland), M O'Sullivan

10:00 - 10:15  Break

10:15 - 11:45  S08  AUSTRALIAN FOOTBALL  Meeting Room 04
Chairs: Aaron Coutts (Australia) & Brian Dawson (Australia)

10:15 - 10:45  S08.1  Recent research findings in Australian football: application to other codes?
Brian Dawson (Australia)

10:45 - 11:00  S08.2  The effects of physical exertion on decision-making performance of Australian football umpires
Kasey Paradis (Australia), D O'Connor, P Larkin

11:00 - 11:15  S08.3  Match success in elite Australian football: a 14-year analysis
Brendan H Lazarus (Australia), AM Stewart, WG Hopkins, RJ Aughey

11:15 - 11:30  S08.4  Seasonal training periodization of an elite team in the Australian Football League
Jonathan Bartlett (UK), D Ritchie, WG Hopkins

11:30 - 11:45  S08.5  Effect of instructions prioritizing speed and/or accuracy on kinematics and kicking performance in experienced football players
Roland Van Den Tillaar (Norway), P Fuglstad

10:15 - 11:45  S09  MATCH ANALYSIS - PART II  Auditorium 02
Chairs: Svein Arne Pettersen (Norway) & Paul S Bradley (UK)

10:15 - 10:45  S09.1  Evolutionary match performance patterns in elite football
Paul S Bradley (United Kingdom)

10:45 - 11:00  S09.2  Game style in soccer: what is it and how can we measure it?
Adam Hewitt (Australia), K Norton

11:00 - 11:15  S09.3  Team dynamics during transition moments in small-sided soccer games
Wouter GP Frencken (The Netherlands), M Wijnbergen, S Olthof, KAPM Lemmink

11:15 - 11:30  S09.4  Determinants of physical match performance in youth football players: neuromuscular aspects
Darragh R Connolly (Italy), C Castagna, L Francini, A Bosio, M Induni, E Rampinini

11:30 - 11:45  S09.5  Determinants of physical match performance in youth football players: metabolic aspects
Carlo Castagna (Italy), L Francini, A Bosio, DR Connolly, D Carlomagno, E Rampinini
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<td>10:15 - 11:45</td>
<td>S10</td>
<td>BIOMECHANICS</td>
<td>Chairs: Per Aagaard (Denmark) &amp; Hiroyuki Nunome (Japan)</td>
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<td>10:15 - 10:45</td>
<td>S10.1</td>
<td>Ball kicking dynamics in football codes: new insight for coaching cues</td>
<td>Hiroyuki Nunome (Japan)</td>
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<td>10:45 - 11:00</td>
<td>S10.2</td>
<td>The effects of wearing textured insoles and clinical compression socks on kicking performance in association football</td>
<td>Hosni Hasan (Australia), K Davids, C Jia Yi, G Kerr</td>
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<td>11:00 - 11:15</td>
<td>S10.3</td>
<td>How panel shape effect to fly on soccer ball</td>
<td>Sungchan Hong (Japan), T Asai</td>
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<td>11:15 - 11:30</td>
<td>S10.4</td>
<td>Upper body kinematic analyses of rugby passes from the ground</td>
<td>Mark Sayers (Australia), R Ballon</td>
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<td>11:30 - 11:45</td>
<td>S10.5</td>
<td>Ground reaction forces and lower limbs muscular activity during soccer goalkeepers’ side dives</td>
<td>Thibaut Hervéou (France), A Rahamni, S Boyas, F Chorin, S Durand</td>
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<td>10:15 - 11:45</td>
<td>S11</td>
<td>FATIGUE - PART I</td>
<td>Chairs: Mario Bizzini (Italy) &amp; Tim Meyer (Germany)</td>
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<tr>
<td>10:15 - 10:45</td>
<td>S11.1</td>
<td>Monitoring of stress and fatigue in football</td>
<td>Tim Meyer (Germany)</td>
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<td>10:45 - 11:00</td>
<td>S11.2</td>
<td>Sleep, travel and recovery of elite footballers during and following long-haul international air travel</td>
<td>Hugh Fullagar (Germany), R Duffield, D Jenkins</td>
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<td>11:00 - 11:15</td>
<td>S11.3</td>
<td>The impact of elite A-league football match play on countermovement-jump performance, salivary cortisol and salivary testosterone</td>
<td>Amber E Rowell (Australia), SJ Cormack, S Skorski, D White, J Bloomfield, T Meyer</td>
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<tr>
<td>11:15 - 11:30</td>
<td>S11.4</td>
<td>The technical and physical performance responses to 120 minutes of soccer-specific exercise</td>
<td>Liam D Harper (UK), DJ West, E Stevenson, M Russell</td>
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<td>10:15 - 11:45</td>
<td>S12</td>
<td>GENERAL PSYCHOLOGY - PART I</td>
<td>Chair: Anne-Marie Elbe (Denmark)</td>
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<tr>
<td>10:15 - 10:45</td>
<td>S12.1</td>
<td>Applying psychology in elite and professional football</td>
<td>Geir Jordet (Norway)</td>
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<td>10:45 - 11:00</td>
<td>S12.2</td>
<td>An exploration into enhancing resilience in Premier League Academy Football players using a positive psychology based educational intervention</td>
<td>Misia Gervis (UK), A Goldman</td>
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<tr>
<td>11:00 - 11:15</td>
<td>S12.3</td>
<td>The influence of perfectionism on psychological well-being in Soccer</td>
<td>Esmie Smith (UK), T Donachie, HK Hall, AP Hill</td>
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<td>11:15 - 11:30</td>
<td>S12.4</td>
<td>Reaching the youth academy level in German football: the relevance of motor and psychological predictors</td>
<td>Oliver Höner (Germany), P Feichtinger, D Murr</td>
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</table>
11:30 - 11:45  S12.5  Starters and non-starters in football: differences in cohesion perceptions
Ioannis Zarotis (Greece), K Papailia, F Dimoula

11:45 - 12:00  Break

12:00 - 13:00  S13  HEALTH - PSYCHOLOGICAL  Meeting Room 04
PERSPECTIVE
Chair: Anne-Marie Elbe (Denmark)

12:00 - 12:30  S13.1  Flow experiences in football: the key to a successful physical activity intervention?
Anne-Marie Elbe (Denmark)

12:30 - 12:45  S13.2  Football on prescription? Football's potential for exercise adherence
Peter Elsborg (Denmark), J Wikman, G Nielsen

12:45 - 13:00  S13.3  An investigation in the characteristics of mental health in athletes with a special focus on football players
Frank Weiland (Germany), K Siefken

12:00 - 13:00  S14  ORGANIZATION, ECONOMICS AND  Meeting Room 05
POLITICS - PART I
Chair: Kari Fasting (Norway)

12:00 - 12:15  S14.1  Tensions in the emergence of bio-therapies and regenerative medicine for musculoskeletal injury in elite football
Alex Faulkner (UK), J Gabe, C Coveney, M McNamee

12:15 - 12:30  S14.2  From soccer school to campus soccer: the transitions of government policy for youth soccer from 1994-2014 in China
Fuquan Lu (Pr China), N Li, S Jia

12:30 - 12:45  S14.3  An analysis of football-specific economics processes and its social values
Ratu Tisha Destria (Indonesia), H Maulana

12:00 - 13:00  POSTER SESSION I

13:00 - 13:45  Lunch

13:45 - 14:15  KP02  KEYNOTE PLENUM  Auditorium 01 + 02
Chair: Gertrud Pfister (Denmark)

The emergence and diffusion of 'Football': a case study in the globalisation of sport
Joseph Maguire (UK)

14:15 - 14:30  Break
14:30 - 15:45  S15  COACHES - SITUATIONS AND CAREERS - PART I  Meeting Room 04

COACHES - SITUATIONS AND CAREERS - PART I
Chair: Donna O’Connor (Australia)

14:30 - 14:45  S15.2  The changing nature of English professional football academy coaching in light of the implementation of Jimmy O’Gorman (UK), M Partington the EPPP

14:45 - 15:00  S15.3  Male top-level football coaches’ attitudes concerning top-level female coaches Trond Svela Sand (Norway), K Fasting, MK Sisjord

15:00 - 15:15  S15.4  ‘Why am I putting myself through this?’ Women football coaches’ experiences of The Football Association’s coach education process Colin Lewis (UK), S Roberts, H Andrews, P Vickerman

15:15 - 15:30  S15.5  What makes an elite under 13 player? The attributes talent identifiers consider important for elite youth performance Paul Larkin (Australia), D O’Connor

14:30 - 15:30  S16  CAREER PATHWAYS AND TALENT DEVELOPMENT - PART I  Meeting Room 05

CAREER PATHWAYS AND TALENT DEVELOPMENT - PART I
Chair: Anne-Marie Elbe (Denmark)

14:30 - 14:45  S16.1  Role of mentorship in an effective talent development environment for a female recreational soccer club Peter Schneider (Germany)

14:45 - 15:00  S16.2  Talents on the pitch: anxiety and action-orientation after failure Stephan Horvath (Switzerland), D Birrer, G Morgan, J Portmann, P Röthlin

15:00 - 15:15  S16.3  Relative age effect and birth place effect in Danish national youth football Niels Nygaard Rossing (Denmark), A Flattum, A Biegel, DS Karbing

15:15 - 15:30  S16.4  Overconfidence and performance level in elite youth soccer players Erik Hofseth (Norway), T Toering, G Jordet, A Ivarsson

14:30 - 15:30  POSTER SESSION II

15:45 - 17:15  S17  TRAINING - PART I  Auditorium 01

TRAINING - PART I
Chairs: Barry Drust (UK) & Marcello Iaia (Italy)

15:45 - 16:00  S17.1  The “Centimax” Borg Scale: validity and interchangeability with CR10® for Session-RPE in soccer Maurizio Fanchini (Italy), I Ferraresi, R Modena, F Schena, AJ Coutts, FM Impellizzeri

16:00 - 16:15  S17.2  Contribution of planned and unplanned training to overall load in elite youth female football players Jonathan Taylor (UK), M Wright, C Hurst, R Best

16:15 - 16:30  S17.3  The effect of sequencing strength and endurance training in young soccer players Anis Chaouachi (Tunisia), I Makhlof, V Manzy, C Catsagna

19
16:30 - 16:45  S17.4  The utilization of video self modelling for the training of non-preferred side kicking in soccer
Kylie Steel (Australia)

16:45 - 17:00  S17.5  The influence of high-intensity training volume on global training loads and recovery of international football players
Tae-Seok Jeong (Korea), Y-S Lee, J Bartlett, B Drust

17:00 - 17:15  S17.6  Effects of speed-endurance training in elite female soccer players on performance and muscular adaptations
Thomas P Gunnarsson (Denmark), C Ørntoft, J Bangsbo

15:45 - 17:15  S18  CHILDREN
Auditorium 02
Chairs: Peter Riis Hansen (Denmark) & Oliver Faude (Switzerland)

15:45 - 16:15  S18.1  Cardiovascular adaptations to football in children
Peter Riis Hansen (Denmark)

16:15 - 16:30  S18.2  The relative age effect in German national youth football
Sabrina Skorski (Germany), S Skorski, O Faude, D Hammes, T Meyer

16:30 - 16:45  S18.3  Influence of biological maturity on the match performance of 8 to 16 year old elite male youth soccer players
Heita Goto (Japan), J Morris, M Nevill

16:45 - 17:00  S18.4  Age-related differences in body size, maturity, fitness, and playing performance in junior Australian football
Paul Gastin (Australia), C Tangalos, S Robertson, PR Hansen, V di Salvo

17:00 - 17:15  S18.5  Cardiovascular adaptations to a 10-week low-volume school-based football intervention for 9-10-yr-old children.
Malte Nejst Larsen (Denmark), CM Nielsen, MB Randers, T Hornstrup, V Manniche, L Hansen, J Dvorak

15:45- 17:15  S19  RUGBY
Meeting Room 03
Chairs: Colin W Fuller (Switzerland) & Brian Dawson (Australia)

15:45 - 16:15  S19.1  Epidemiology of rugby injuries
Colin W Fuller (Switzerland)

16:15 - 16:30  S19.2  Effective lineout tactics in high performance rugby union
Jessika Morris (Australia), M Sayers, M Stuelcken

16:30 - 16:45  S19.3  Network centrality analysis may clarify the systematic defence performance of rugby union
Koh Sasaki (Japan), J Murakami, T Yamamoto, Y Ueno, K Washiya, S Tanaka, K Shirai, M Miyao

16:45 - 17:00  S19.4  Association between injuries and team success in elite rugby union
Sean Williams (UK), G Trewartha, SPT Kemp, JHM Brooks, CW Fuller, AE Taylor, MJ Cross, KA Stokes

17:00 - 17:15  S19.5  Performance on the Functional Movement Screen in youth rugby players
Mike D Hislop (UK), KA Stokes, M England, SPT Kemp, G Trewartha

15:45 - 17:15  S20  PEDAGOGICAL ISSUES
Meeting Room 04
Chair: Donna O'Connor (Australia)
15:45 - 16:15  S20.1  Coaching practice and player development  
*Donna O'Connor (Australia)*

16:15 - 16:30  S20.2  Usage of futsal balls enhances the quality of play in school football tuition  
*Christopher Heim (Germany), U Frick*

16:15 - 16:45  S20.3  The construction of action knowledge and learning competences in football,  
a didactic model of the game action competences  
*Elkin Arias (Colombia), WG Valencia, H Marín, A Arias*

16:45 - 17:00  S20.4  A new didactics for cultivating creative football players  
*Ludvig JT Rasmussen (Denmark), LD Østergaard*

17:00 - 17:15  S20.5  Weaker, one strong’ - pedagogical considerations of developing an elite players non dominant foot through a game centred approach  
*Michael Ayres (UK), S Page*

15:45 - 17:15  S21  ORGANIZATION, ECONOMICS  
AND POLITICS - PART II  
Meeting Room 05  
*Chair: Kari Fasting (Norway)*

15:45 - 16:15  S21.1  Development and voluntarism in football clubs  
*Siegfried Nagel (Switzerland)*

16:15 - 16:30  S21.2  Learning capacities of voluntary sport clubs in relation to external advisory  
*Benjamin Egli (Switzerland), C Klenk, T Schlesinger, S Nagel*

16:30 - 16:45  S21.3  The Director of Football: challenges to the prototypical model of management within the English Premier League  
*Ian Lawrence (UK)*

16:45 - 17:00  S21.4  Organizational culture change in amateur football clubs - a critical reflection  
*Magnus Forslund (Sweden)*

17:00 - 17:15  S21.5  "Football fitness has changed the club from an absolutely laddish atmosphere to a respectably place"  
*Søren Bennike (Denmark), L Ottesen*

18:00 - 20:00  Football tournaments

18:00 - 18:30  Warming up (Instructors from The Danish Football Association)

18:30 - 20:00  The Tournaments

21:30 - 22:30  Young researchers event - Local beer tasting
**FRIDAY, 22 MAY 2015**

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<td><strong>09:00 - 10:15</strong></td>
<td><strong>W04</strong></td>
<td>Auditorium 01</td>
<td>Training and performance characteristics of professional Australian Football</td>
<td>Chairs: Brian Dawson (Australia) &amp; Aaron Coutts (Australia)</td>
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<td><strong>09:00 - 10:15</strong></td>
<td><strong>W05</strong></td>
<td>Auditorium 02</td>
<td>Fitness coaching in an elite football team - with special focus on individual-based approach</td>
<td>Chairs: Magni Mohr (Faroe Islands) &amp; Marcello Iaia (Italy)</td>
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<td><strong>09:00 - 10:15</strong></td>
<td><strong>S22</strong></td>
<td>Meeting Room 03</td>
<td>Injury Prevention</td>
<td>Chairs: Tim Meyer (Germany) &amp; Per Hölmich (Denmark)</td>
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<td>09:00 - 09:30</td>
<td><strong>S22.1</strong></td>
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<td>Prevention of hip and groin injuries in football</td>
<td>Per Hölmich (Denmark)</td>
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<td>09:30 - 09:45</td>
<td><strong>Cancelled</strong></td>
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<td>Cancelled - break</td>
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<td>09:45 - 10:00</td>
<td><strong>S22.3</strong></td>
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<td>Hamstring injury prevention in soccer: before or after training?</td>
<td>Ric Lovell (Australia), J Siegler, P Marshall</td>
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<td><strong>09:00 - 10:15</strong></td>
<td><strong>S23</strong></td>
<td>Meeting Room 04</td>
<td>A MULTI-DISCIPLINARY EXAMINATION OF DEVELOPMENT AND PERFORMANCE OF FOOTBALL</td>
<td>Chair: Itay Basevitch (UK)</td>
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<td>09:00 - 09:15</td>
<td><strong>S23.1</strong></td>
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<td>A multi-disciplinary examination of football development and performance: a perceptual-cognitive perspective</td>
<td>Itay Basevitch (UK), C Rossato, K van Paridon, G Tenenbaum, E Filho, P Ward</td>
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<td>09:15 - 09:30</td>
<td><strong>S23.2</strong></td>
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<td>A physiological monitoring perspective</td>
<td>Dan Gordon (UK), J Baker, A Scruton</td>
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<td>09:30 - 09:45</td>
<td><strong>S23.3</strong></td>
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<td>A social-gender perspective</td>
<td>Katrina McDonald (UK), N Collins, E Hope, K Whitehead</td>
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<td><strong>S23.4</strong></td>
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<td>A psychophysiological perspective</td>
<td>Kjell van Paridon (UK), I Basevitch, M Bristow, C Campbell</td>
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<td><strong>S24</strong></td>
<td>Meeting Room 05</td>
<td>Football Fans</td>
<td>Chair: Albrecht Sonntag (Germany)</td>
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<td>09:00 - 09:30</td>
<td><strong>S24.1</strong></td>
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<td>Women’s football: the game and its fans</td>
<td>Gertrud Pfister (Denmark)</td>
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<td>09:30 - 09:45</td>
<td><strong>S24.3</strong></td>
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<td>Motivations and expectations of sports spectators scale: new tools for identifying soccer spectators’ motivations</td>
<td>Florian Escoubes (France)</td>
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<td>S24.4</td>
<td>Passions and Colors of Bare fans, social meanings of acting of Cheering for a professional soccer team in Manaus</td>
<td>Alexandre Marco Araújo Chaves (Brazil), A de Araújo Soares</td>
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<td>10:15 - 10:30</td>
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<td><strong>Break</strong></td>
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<td>10:30 - 11:45</td>
<td>S25</td>
<td><strong>ENVIRONMENT</strong></td>
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<td>Chairs: Magni Mohr (Faroe Islands) &amp; Lars Nybo (Denmark)</td>
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<td>10:30 - 11:00</td>
<td>S25.1</td>
<td>Physiological responses and consequences of playing in the heat</td>
<td>Lars Nybo (Denmark)</td>
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<td>11:00 - 11:15</td>
<td>S25.2</td>
<td>No additional benefit of repeat-sprint training in hypoxia than in normoxia on sea-level repeat-sprint ability</td>
<td>Paul Goods (Australia), B Dawson, G Landers, C Gore, P Peeling</td>
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<td>11:15 - 11:30</td>
<td>S25.3</td>
<td>Running performance during WC 2014 under different climatic conditions</td>
<td>Markus Tschopp (Switzerland), D Baumgartner</td>
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<td>S25.4</td>
<td>Reduced team sport performance up to four days following long-haul trans-meridian air travel</td>
<td>Peter Fowler (Qatar), R Duffield, S Crowcroft, A Mendham, S Halson, J Vaile, W Knez</td>
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<td>10:30 - 11:45</td>
<td>S26</td>
<td><strong>TRAINING - PART II</strong></td>
<td><strong>Auditorium 02</strong></td>
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<td>Chairs: Hiroyuki Nunome (Japan) &amp; Per Aagaard (Denmark)</td>
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<td>10:30 - 11:00</td>
<td>S26.1</td>
<td>Eccentric training as treatment</td>
<td>Per Aagaard (Denmark)</td>
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<td>11:00 - 11:15</td>
<td>S26.2</td>
<td>Peak power sprinting: a new training approach for sprinting ability in soccer</td>
<td>Carlo Zanetti (Italy), J Bangsbo</td>
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<td>11:15 - 11:30</td>
<td>S26.3</td>
<td>The effects of different seasonal strength training protocols on androgen levels and neuromuscular exercise performance in professional soccer players</td>
<td>Nikolaos Koundourakis (Greece), N Androulakis, M Venihaki, E Castanas, N Malliaraki, A Margioris</td>
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<td>11:30 - 11:45</td>
<td>S26.4</td>
<td>The acute hormonal responses to two concurrent endurance and strength-training programs in elite soccer players</td>
<td>Kevin Enright (UK), JP Morton, J Iga, B Drust</td>
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<td>10:30 - 11:45</td>
<td>S27</td>
<td><strong>HEALTH - PART II</strong></td>
<td><strong>Meeting Room 03</strong></td>
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<td>Chairs: Tim Meyer (Germany) &amp; Rob Duffield (Australia)</td>
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<td>10:30 - 11:00</td>
<td>S27.1</td>
<td>Rugby for health</td>
<td>Rob Duffield (Australia)</td>
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<td>11:00 - 11:15</td>
<td>S27.2</td>
<td>Impact of walking football: effective team strategies for high performance veteran players</td>
<td>Harry Hubball (Canada), P Reddy</td>
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<td>11:15 - 11:30</td>
<td>S27.3</td>
<td>Common mental disorders among professional footballers in five European countries</td>
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</tbody>
</table>
11:30 - 11:45  S27.4  Bringing neuroscience into football training: principles of training working memory within football coaching
Joseph Hall (New Zealand), I Culpan, J Clarke

10:30 - 11:45  S28  MATCH ANALYSIS - PART III  Meeting Room 04
Chairs: Brian Dawson (Australia) & Pietro Di Prampero (Italy)

10:30 - 10:45  S28.1  The assessment of speed changes in soccer and their effects on energy expenditure
Pietro Enrico di Prampero (Italy), C Osgnach, A Botter, A Olivieri, M Vettor, V Roberti

10:45 - 11:00   S28.2  Comparison of the movement demands of Australian National Rugby League referees under the '2-referee model'
Matthew D Jeffriess (Australia), CR Black, AJ Coutts

11:00 - 11:15  Cancelled - break

11:15 - 11:30  Moved to Poster P04.9 – break
Joao Duarte et al.

11:30 - 11:45  S28.4  Consistency of elite soccer referees' in-season training and match physical loads
Matthew Weston (UK)

10:30 - 11:45  S29  CAREER PATHWAYS AND TALENT DEVELOPMENT - PART II  Meeting Room 05
Chair: Donna O'Connor (Australia)

10:30 - 11:00  S29.1  New trends in career/talent development research: implications for football
Natalia Stambulova (Sweden)

11:00 - 11:30  S29.2  Psychological underpinnings of a cultural transition in football
Tatiana Ryba (Finland)

11:30 - 11:45  S29.3  Filling the void in talent development: fifteen years of practical experiences as a sport psychology consultant within youth football
Johan Fallby (Sweden)

11:45 - 12:00  Break

12:00 - 13:00  S30  SPORT HISTORY. POLITICS AND POLICIES - A Historical Perspective  Meeting Room 05
Chair: Gertrud Pfister (Denmark)

12:00 - 12:30  S30.1  European football between tradition and postmodernity
Albrecht Sonntag (France)

12:30 - 12:45  S30.2  A game of two sides: formal division of ZAR Rugby, 1889-1899
Colin du Plessis (South Africa)

12:45 - 13:00  S30.3  Soccer and sorcery. Performing history in the football environment
Katarzyna Herd (Sweden)

12:00 - 13:00  POSTER SESSION III

13:00 - 13:45  Lunch
13:45 - 14:15 KP03  KEYNOTE PLENUM  Auditorium 01 + 02
Chair: Pekka Luhtanen (Finland)
Testing and training in football
Jens Bangsbo (Denmark)

14:15 - 14:30  Break

14:30 - 15:30  POSTER SESSION IV

15:30 - 15:45  Break

15:45 - 17:00 S31  TRAINING - PART II  Auditorium 01
Chairs: Per Aagaard (Denmark) & Jesper Løvind Andersen (Denmark)

15:45 - 16:15  S31.1  Power training in football
Jesper Løvind Andersen (Denmark)

16:15 - 16:30  S31.2  Effectiveness of treadmill versus ground-based over-speed training on speed, power, agility, and high intensity running ability in youth female soccer players
Riccardo Bucciarelli (Canada), F Yousefian, J Cresser, A Rocha, C Hawksworth

16:30 - 16:45  S31.3  Subjective ratings for readiness to train do not predict training performance or capability in elite soccer players throughout a season
Jack Dowling (UK), A Hulton, M Taberner, M Lake

15:45 - 17:00 S32  WOMEN'S FOOTBALL  Auditorium 02
Chairs: Paul S Bradley (UK) & Magni Mohr (Faroe Islands)

15:45 - 16:15  S32.1  Physiology of women’s football from elite to recreational level
Magni Mohr (Faroe Islands)

16:15 - 16:30  S32.2  Neuromuscular fatigue and muscle damage in Women’s Rugby Sevens
Anthea Clarke (Australia), J Anson, D Pyne

16:30 - 16:45  S32.3  Comparison of preferred and non-preferred leg kicking in females
Kevin Ball (Australia), L Parrington, B Hall

15:45 - 17:00 S33  GAELIC FOOTBALL  Meeting Room 03
Chairs: Brian Dawson (Australia) & Philip Glasgow (UK)

15:45 - 16:15  S33.1  Activate GAA: key lessons from the effective implementation of an injury prevention program in Gaelic football
Philip Glasgow (UK)

16:15 - 16:30  S33.2  The work rate and metabolic power of elite Gaelic football
Shane Malone (Ireland), K Collins, D Doran, AP McRobert
ORAL PROGRAM – FRIDAY, 22 MAY 2015

16:30 - 16:45 S33.3 The performance profile and physical demands of elite Gaelic football
Kieran Collins (Ireland), D Doran

16:45 - 17:00 S33.4 Acceleration and deceleration profiles in elite senior Gaelic footballers
Declan Gamble (UK), N Moyna, M Spencer

15:45 - 17:00 S34 WOMEN'S FOOTBALL Meeting Room 04
Chair: Laila Ottesen (Denmark)

15:45 - 16:15 S34.1 The experiences of female elite football coaches
Kari Fasting (Norway), TS Sand, HR Nordstrand

16:15 - 16:45 S34.2 Women's football - economic perspectives
Marie-Luise Klein (Germany)

16:45 - 17:00 S34.3 Japan - a pioneer country in women’s football
Bente Ovedie Skogvang (Norway)

15:45 - 17:00 S35 COACHES - SITUATIONS AND CAREERS PART II Meeting Room 05
Chair: Gerald Gems (USA)

15:45 - 16:00 S35.1 An analysis of activity types during youth soccer coaching sessions
Jordan Whelan (UK), AP McRobert, WA Allison, PR Ford

16:00 - 16:15 S35.2 Dealing with managerial challenges in professional football
Kjell Marius Herskedal (UK), D Richardson, MS Nesti, M Littlewood

16:15 - 16:30 S35.3 Coach education intervention modulates soccer practice activities
Makoto Uji (UK), PR Ford, NC Foster, AP McRobert, SJ Hayes

16:30 - 16:45 S35.4 The power of perception: player/coach perceptions of performance qualities in elite football
Craig Winstanley (UK)

16:45 - 17:00 S35.5 Background and evidence to support the Empowering CoachingTM education program
Paul Appleton (UK), J Duda

17:00 - 17:15 Break

17:15 - 18:15 W06 WORKSHOP Meeting Room 03
Chairs: Morten Randers (Denmark) & Carlo Castagna (Italy)

Association football referee performance and training
Carlo Castagna (Italy)

17:15 - 18:15 S36 INJURIES - PART II Auditorium 02
Chairs: Per Hölmich (Denmark) & Astrid Junge (F-MARC, FIFA, Germany)

17:15 - 17:45 S36.1 Epidemiology of injury in women’s football
Astrid Junge (F-MARC, FIFA, Germany)

17:45 - 18:00 S36.2 Evaluating markers of ACL injury risk during simulated soccer match-play: a biomechanical and isokinetic investigation

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Raja Mohammed Firhad Raja Azidin (UK), S Sankey, B Drust, M Robinson, J Vanreenterghem, F Bossuyt

18:00 - 18:15 S36.3 A comparison of injuries sustained on artificial and natural soccer turfs among premier soccer league football players in Zimbabwe
Edward Chagonda (Zimbabwe)

17:15 - 18:15 S37 TESTING - PART II Auditorium 01

17:15 - 17:30 S37.1 Functional Movement Screen: poor relation with athletic performance
Matthew Attwood (UK), S Roberts, KA Stokes, G Trewartha

17:30 - 17:45 S37.2 Spatial memory precision in elite and non-elite youth soccer players
Lot Verburgh (The Netherlands), M Konigs, E Scherder, P van Lange, J Oosterlaan

17:45 - 18:00 S37.3 Reliability and validity of Yo-Yo tests in football players and matched untrained school students across 9-16 years
Susana Póvoas (Portugal), C Castagna, M Lopes, P Krstrup

18:00 - 18:15 S37.4 Relationship between Yo-Yo IR2 and physical performance during small-sided games in soccer
Tom Stevens (The Netherlands), C de Ruiter, P Beek, G Savelsbergh

17:15 - 18:15 S38 CAREER PATHWAYS AND TALENT DEVELOPMENT - PART III Meeting Room 04

17:15 - 17:30 S38.1 The effects of a team building intervention in young elite football players
Johan Wikman (Denmark), R Stelter, NK Petersen, A-M Elbe

17:30 - 17:45 S38.2 Moved to poster P08.11

17:45 - 18:00 S38.3 Patterns of motor abilities and technical skills as predictors of success for young elite football players
Marc Zibung (Switzerland), C Zuber, A Conzelmann

18:00 - 18:15 S38.4 Creativity, decision making and visual search in skilled soccer players
André Roca (UK), D Memmert, PR Ford

17:15 - 18:15 S39 MORALITY Meeting Room 05

17:15 - 17:45 S39.1 Doping in football: a moral psychology perspective
Maria Kavussanu (UK)

17:45 - 18:00 S39.2 Sport science and elite football: what’s the Bobby Moore?
Peter Kennedy (UK)

18:00 - 18:15 S39.3 Socials costs to French professional footballers: the future of French apprentices after eviction from football academies
Pierre-Cédric Tia (France)

19:30 – 24:00 Congress Dinner
SATURDAY, 23 MAY 2015

09:00 - 10:15 S40 TACTIC AND TECHNIC Meeting Room 03
Chairs: Pekka Luhtanen (Finland) & Sigrid Olthof (The Netherlands)

09:00 - 09:15 S40.1 Intensity and technical actions in female youth soccer games
Christina Ørntoft (Denmark), MN Larsen, TB Andersen, LS Rasmussen, MB Randers, P Krustrup

09:15 - 09:30 S40.2 Attacking and defending team behaviour in 8v8 and 11v11
Sigrid Olthof (The Netherlands), WGP Frencken, KAPM Lemmink

09:30 - 09:45 S40.3 Effect of the small-sided games and conventional aerobic interval training on the various physiological characteristics and defensive and offensive skills used in soccer
Niyazi Eniseler (Turkey), I Ozcan, C Sahan

09:45 - 10:00 S40.4 Influence of ball possession on physical and technical indicators in FIFA World Cup
Gustavo Ribeiro da Mota (Brazil), C Thiengo, S Gimenes, PS Bradley

09:00 - 10:15 S41 FATIGUE - PART II Auditorium 02
Chairs: Darren J Paul (Qatar) & Nikolai Nordsborg (Denmark)

09:00 - 09:15 S41.1 Reliability of a range of fatigue variables in elite soccer players
Robin Thorpe (UK), T Strudwick, M Buchheit, G Atkinson, B Drust, W Gregson

09:15 - 09:30 S41.2 Recovery after training in elite youth soccer players: sleep on it?
Michel S Brink (The Netherlands), RPJ Zuurbier, WGP Frencken, KAPM Lemmink

09:30 - 09:45 S41.3 Correlation between the perceived recovery status, wellness and salivary markers of health in soccer players
Darren J Paul (Qatar), O Caro, G Nassis

09:45 - 10:00 S41.4 Responses to an intensified period of match play amongst elite youth footballers
Neil Gibson (UK), S MacNay, T Mullen, R McCunn, C Twist

10:00 - 10:15 S41.5 Mental fatigue impairs footballer performance
Michele Merlini (UK)

09:00 - 10:15 S42 TRAINING - PART III Auditorium 01
Chairs: Hassane Zouhal (France) & Geert Savelsbergh (The Netherlands)

09:00 - 09:15 S42.1 Effects of training load on inflammation and muscle damage during a pre-season period in elite soccer players
Hassane Zouhal (France), S Coppalle, C Groussard, G Ravé, W Kebsi

09:15 - 09:30 S42.2 Physical demands of street soccer - effect of boards
Morten B Randers (Denmark), J Brix, JJ Nielsen, P Krustrup

09:30 - 09:45 S42.3 Is there a place for static stretching in warm-up routines of soccer players?
Theocharis Ispoglou (UK), B Jones, PS Bradley, J O’Hara
09:45 - 10:00  S42.4  Measuring game insight skills of elite young football players  
Geert Savelsbergh (The Netherlands), D Tebbes

10:00 - 10:15  S42.5  Football training improves bone health in middle-aged sedentary women with no effects of swim-training  
Eva Wulff Helge (Denmark), M Mohr, P Krustrup

09:00 - 10:15  S43  GENERAL PSYCHOLOGY - PART II  Meeting Room 04  
Chair: Natalia Stambulova (Sweden)

09:00 - 09:15  S43.1  Psychological factors in male and female Swiss National Soccer Teams  
Daniel Birrer (Switzerland), S Horwath, G Morgan

09:15 - 09:30  S43.2  Contribution to a qualitative assessment of cohesion in sports groups  
Ghislain Modeste Onomo Onomo (France), P Chazaud

09:30 - 09:45  S43.3  A qualitative study of authentic leadership in sport  
Comille Bandura (UK), M Kavussanu, S Grogan

09:45 - 10:00  S43.4  Make or break? The 18-21 phase of development through the perspectives of the under21 coach within elite level football  
Chris Dowling (UK), D Richardson, M Littlewood, M Nesti

09:00 - 10:15  S44  MIGRATION & INTEGRATION  Meeting Room 05  
Chair: Maria Kavussanu (UK)

09:00 - 09:15  S44.1  Sport-contextual factors and psychological integration: a cross-sectional study in multicultural youth football teams and related coaches in the Netherlands  
Silke Dankers (Denmark), S Otten, X Sanchez, N van Yperen, A-M Elbe

09:15 - 09:30  S44.2  Football as promotion of active citizenship and identity development - supporting boys in a school with high percentage migration background  
Knud Ryom (Denmark), R Stelter

10:15 - 10:30  Break
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Location</th>
<th>Speakers</th>
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<tbody>
<tr>
<td>10:30 - 12:00</td>
<td>S45</td>
<td>MEET THE EXPERTS</td>
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<td>Per Hölmich (Denmark) Magni Mohr (Faroe Islands) Maria Kavussanu (UK)</td>
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<td>Aaron Coutts (Australia) Natalia Stambulova (Sweden)</td>
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<td>Kari Fasting (Norway) Tim Meyer (Germany) Brian Dawson (Australia) Carlo Castagna (Italy)</td>
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<td>10:30 - 12:00</td>
<td>S46</td>
<td>HEALTH - PART III</td>
<td>Auditorium 05</td>
<td>Chairs: Peter Riis Hansen (Denmark) &amp; Lars Juel Andersen (Denmark)</td>
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<td>10:30 - 11:00 S46.1 Players’ heart Lars Juel Andersen (Denmark)</td>
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<td>11:00 - 11:15 S46.2 Positive effects of short term football on bone health in men undergoing androgen deprivation therapy for prostate cancer Jacob Uth (Denmark), T Hornstrup, JF Christensen, KB Christensen, NR Jørgensen, EW Helge, K Brasso, JW Helge, LL Andersen, M Rørth, J Midtgaard, P Krstrup</td>
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<td>11:15 - 11:30 S46.3 The FIFA Sudden Death Registry (FIFA-SDR): first results Jürgen Scharhag (Germany), P Bohm, J Dvorak, T Meyer</td>
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<td>11:30 - 11:45 S46.4 Strenuous exercise and endothelial function in professional soccer players Nikolaos Androulakis (Greece), N Koundourakis, M Marketou, P Spaharaki, E Nioti, J Christoforakis, M Alexandrakis</td>
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<td>10:30 - 12:00</td>
<td>S47</td>
<td>GENERAL PSYCHOLOGY - PART III</td>
<td>Meeting Room 03</td>
<td>Chair: Gertrud Pfister (Denmark)</td>
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<td>10:30 - 10:45 S47.1 Cognitive flexibility and tactical behavior of soccer players Marcelo Andrade (Brazil), I Teoldo da costa</td>
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<td>10:45 - 11:00 S47.2 Preventing athlete burnout among Japanese adolescent soccer players Yusuke Tabei (Japan), M Nakayama, T Asai</td>
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<td>11:00 - 11:15 S47.3 Competitive balance in the MLS and new methods of analysis Carlos Gómez González (Spain), JG Unanue, SR Cañamero, JLF Hernández, AF Luna, MS Mathew, J del Corral Cuervo, LG Guerrero</td>
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<td>11:15 - 11:30 S47.4 Sources of strain; stress and coping in elite soccer performance schools Amanda Wilding (UK)</td>
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<td>11:00 - 11:15</td>
<td>S48.3</td>
<td>Soccer a jury sport? Or, the Influence of wrong referee decisions</td>
<td>Gerard Sierksma (The Netherlands)</td>
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<td>11:15 - 11:30</td>
<td>S48.4</td>
<td>The role of sport agents in career planning for young soccer players</td>
<td>Lucas Silvestre Capalbo (Sweden)</td>
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<td>11:30 - 11:45</td>
<td>S48.5</td>
<td>The expected value of draft selections in professional Australian</td>
<td>Courtney Sullivan (Australia), T Kempton, AJ Coutts</td>
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<td>12:00 – 12:15</td>
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<td>Break</td>
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**12:15 - 12:45**

**TOM REILLY MEMORIAL LECTURE**  
**Auditorium 01+02**  
*Barry Drust (UK)*

**12:45 - 13:15**

**CLOSING CEREMONY**  
**Auditorium 01+02**  
*Chairs: Jens Bangsbo (Denmark) & Peter Krustrup (Denmark)*
# POSTER LINE UP

**THURSDAY, 21 MAY 2015**

**POSTER SESSION I**

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<tr>
<td>12:00-13:00</td>
<td>P01</td>
<td><strong>BIOMECHANICS, WOMEN &amp; NUTRITION AND SUPPLEMENTATION</strong></td>
<td>Chair: Hiroyuki Nunome (Japan)</td>
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<tr>
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<td>P01.01</td>
<td>Counter-rotating vortex pair of a soccer ball in flight</td>
<td>Takeshi Asai (Japan), S Hong, K Kamemoto</td>
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<td></td>
<td>P01.02</td>
<td>Kinematics of ball stopping technique in soccer</td>
<td>Takahito Iga (Japan), H Nunome, K Matsui, T Fukuzumi, Y Ikegami</td>
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<td>P01.03</td>
<td>Kinetic analysis of instep kick towards various directions</td>
<td>Koichiro Inoue (Japan), H Nunome</td>
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<td>P01.04</td>
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<td>Thomas Bull Andersen (Denmark), H Sørensen</td>
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<td>P01.05</td>
<td>Biomechanical characteristics of the long throw-in in soccer</td>
<td>Hironari Shinkai (Japan)</td>
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<td>P01.06</td>
<td>A three-dimensional analysis of one-handed aerial soccer</td>
<td>Neal Smith (UK), I Steendahl</td>
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<td>P01.07</td>
<td>Dietary habits in elite soccer team</td>
<td>Cristian Petri (Italy), G Mascherini, L Sequi, G Galanti</td>
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<td>P01.08</td>
<td>Pre-season changes in anthropometric characteristics of elite inter-county Gaelic footballers</td>
<td>Marcus Shortall (Ireland), D Doran, K Collins</td>
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<tr>
<td>12:00-13:00</td>
<td>P02</td>
<td><strong>CHILDREN</strong></td>
<td>Chair: Peter Riis Hansen (Denmark)</td>
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<tr>
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<td>P02.01</td>
<td>Do young football players need to learn how to start the game (set-pieces)?</td>
<td>Sixto González-Villora (Spain), JC Pastor-Vicedo, J Serra-Olivares</td>
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<td>P02.02</td>
<td>Anthropometric, fitness and coaches' perceptions of technical skill favour early maturing adolescent Australian footballers</td>
<td>Ashley Cripps (Australia), L Hopper, C Joyce</td>
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<td>P02.03</td>
<td>Playing position characteristics of elite youth (13-18 years) soccer players in England</td>
<td>Christopher Towlson (UK), A Midgley, A Garrett, G Parkin, R Lovell</td>
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<td>P02.04</td>
<td>The postural sway of center of gravity agitation in Japanese high school Rugby Union players</td>
<td>Jun Mizohata (Japan), H Kimura, M Takamura, K Hayasaka, H Nada, K Hirose, H Takahash</td>
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<td>P02.05</td>
<td>Relationships between physical fitness and birth distribution on elite Japanese soccer players aged 13-17 years</td>
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Osamu Miyagi (Japan), Y Morishima, R Kawamoto, J Ohashi

P02.06 Talent identification of young players in the context of a professional soccer club

Susana Maria Gil (Spain), I Bidaurrazaga-Letona, JA Lekue

P02.07 Investigating the factors that affect sprint performance of young soccer players

Surhat Muniroglu (Turkey), G Diker, S On, H Ozkamci

P02.08 Somatic maturation and physical performance in young soccer players

Rodrigo Lopes Pignatario Silva (Brazil), J Hespanhol, MA Cossío-Bolaños, M Arruda, T Santi Maria

12:00 - 13:00

P03 FATIGUE

Chair: Magni Mohr (Italy)

P03.01 Alterations in secretory immunoglobulin. A pre and post professional Australian Rules Football matches

Sam Coad (Australia), C McLellan, B Gray, T Whitehouse

P03.02 Post-match fatigue kinetic of professional and young soccer players during competitive period

Leo Djaoui (France), C Hautier, A Dellal

P03.03 Parasympathetic activity and perception’s data responses following a cold water immersion session and a whole body cryostimulation

Claire Tourny (France), T Cotte, S Sangner

P03.04 Warm-up or cool-down? The effect of timing of an ankle injury prevention program in elite male soccer players

Chris Brogden (UK), K Marrin, M Greig

P03.05 The physiological and biomechanical response to a simulated period of short-term fixture congestion

Richard Page (UK), K Marrin, M Greig

P03.06 The influence of fatigue on the external:internal training load ratios in soccer

Ibrahim Akubat (UK), S Barratt, M Lapuente, G Abt

P03.07 Time-motion patterns and neuromuscular fatigue influences on technical performance in futsal players

Fabio Milioni (Brazil), LH P Vieira, AM Zagatto, RA Barbieri, JW dos Santos, PRP Santiago, NB Nordsborg, M Papoti

P03.08 The effect of maximal aerobic speed test and soccer match on mucosal immune system and Epstein-Barr virus (EBV) in collegiate soccer players

Daisuke Nakamura (Japan), O Miyagi, T Akimoto

P03.09 Accelerometer for measurement intensity training in youth football players: a help in the formative process to the elite

Juan Carlos Pastor Vicedo (Spain), JM Martínez, JS Olivares, SG Víllora

P03.10 Fatigue effect on the speed and accuracy among professional football players

Zakaria Labsy (France), C Tourny, K Collomp

12:00 - 13:00

P04 HEALTH - PREVENTION, TREATMENT & REHABILITATION
Chair: Carlo Castagna (Italy)

P04.02 Action of the injury prevention check sheet and preventive programs for junior high school soccer players
Tomoaki Sugaya (Japan), R Nakazawa, S Okamoto, R Saito, M Sakamoto, Y Kusama

P04.03 Risk assessment of shoulder injuries using preseason muscle strength test in collegiate Rugby Union players
Ryo Ogaki (Japan), M Takemura, S Nagai, Y Imoo, S Takaki, K Shirahata, S Miyakawa

P04.04 Relationship between the ability of dynamic balance and muscular flexibility for junior high school soccer players
Shogo Okamoto (Japan), T Sugaya, R Nakazawa, R Saito, M Sakamoto, Y Kusama

P04.05 Running performance during recreational soccer match in Japanese senior players aged Over-60 yrs
Satoshi Ishizaki (Japan), A Souma, R Iseyama, K Sakaue, M Yasumatsu, M Ayabe, H Naito

P04.06 Recreational football for employees
Therese Hornstrup (Denmark), C Hansen, Lasse Poder, P Krustrup

P04.07 Risk heat-related illnesses and environmental conditions of soccer trainings in Ceará State, Brazil
Ialuska Guerra (Brazil), A Tavares, M do Socorro Sousa, J Araújo, J Santos

P04.08 Correlation between physical condition and mistakes made by football players
Muhammad Syafiq Bahanan (Indonesia), AN Asyhar, H Maulana, RT Destria

P04.09 Training experience in soccer and bone health among young adult males: comparison between soccer players and non-athletes
João P Duarte (Portugal), MJ Coelho-e-Silva, J Valente-dos-Santos, Ó Tavares, R Soles-Gonçalves, A Seabra, RM Malina

12:00 - 13:00 P05 VARIA - FATIGUE, MATCH ANALYSIS & INJURIES
Chair: Brian Dawson, (Australia)

P05.01 The association between components of training and match workload and hamstring strength asymmetry
Jason O’Keefe (UK), D Cohen, M Taberner, N Clarke

P05.02 Monitoring sleep, well-being and training load during a season in Norwegian professional football
Håvard Wiig (Norway), T Raastad, TE Andersen, M Spencer

P05.03 Capturing player vision: using spatiotemporal analysis to quantify and assess a players passing options
Paul Power (UK)

P05.04 Modelling and comparison of acceleration ability of players
Naoya Hirato (Japan), T Taki, J Hasegawa
P05.05 Construction of a reliable model for the analysis of soccer as a complex system
Maurici Abraham Lopez Felip (USA), T Davis

P05.06 Differences of performances depending on overseas and domestic league players' ratio in 2002, 2006, 2010 soccer World Cups
Hyongjun Choi (Korea), B-S Lee

P05.07 The influence of tackle posture to tackle performance
Kentaro Suzuki (Japan), Y Ueno, J Takamatsu, K Morimoto, I Watanabe, M Watada, M Nishiki, T Tsubakihara, M Yamada

P05.08 Analysis of games missed due to injury in professional soccer: a new potential risk factor
Fabio Massimo Francioni (Italy), CM Wright, C Carling, A Tessitore

P05.09 Concussion knowledge among Japanese high school rugby teams
Mutsuo Yamada (Japan), Y Ueno, M Nishiki, M Toyama, F Nakamura, H Sato, M Nishiki, K Suzuki, K Morimoto, M Furuya

POSTER SESSION II

14:30 - 15:30 P06 MATCH ANALYSIS - PART I
Chair: Brian Dawson (Australia)

P06.01 The relationship between physical/technical capacity and tactical prominence in match performance in young soccer players
António J Figueiredo (Portugal), FML Clemente, FML Martins, RS Mendes, DP Wong

P06.02 High-intensity actions influence shooting success in football
Matthew Varley (Australia), T Akturk, T Gabbett

P06.03 Case study on offensive tactics in top-level women’s football in Japan
Masanori Mori (Japan), M Haranaka, T Tamura, H Horino, M Koido, M Nakayama, T Asai

P06.04 Assessment of physical performance using GPS during competitive matches in youth elite soccer players
Matteo Fiorenza (Denmark), FM Iaia, G Alberti, M Fanchini

P06.05 Analysis of line movement in elite soccer games
Lars Bo Kristensen (Denmark), TB Andersen

P06.06 Analysis of the impact of team formation on the creation of numerical dominance of F.C.Barcelona during the UEFA Youth League
Ferran Vilà Carreras (Spain), MA López Felip

P06.07 Analysis of ball circulation of the Brazilian and German National Soccer Teams in the 2014 FIFA® World Cup
Rodrigo Santos (Brazil), L Mantovani, I Teoldo da Costa

P06.08 Influence of pitch zone in game area dimension in professional Spanish football. Extrapolating from match analysis to tactical training drills
Asier A Zubillaga (Spain), O Caro, L Fradua, FJ Fernandez-Navarro
14:30 - 15:30  P07  INJURIES

Chair: Colin Fuller (United Kingdom)

P07.01 Interest of an injury study for physical preparation coaches
Gabriel Calderon (France), V Parades, Z Labsy, V Aliche Tablero, C Tourny

P07.02 Very-high chronic workload is not related to injury in elite rugby league players
Billy Hulin (Australia), T Gabbett, P Caputi, D Lawson, J Sampson

P07.03 Mechanism of anterior cruciate ligament injuries in female soccer players
Satoshi Kaneko (Japan), S Sasaki, Y Nagano, N Hirose, T Fukubayashi

P07.04 Kinetic characteristics of kicking motion between football players with or without groin pain - from motion analysis of inside kick
Kenji Murakami (Japan), S Miyakawa, H Nagamoto

P07.05 The effect of mobilising the L4 and L5 zygapophyseal joints on hamstring extensibility in elite footballers
Paul Chesterton (UK), M Weston, M Butler

P07.06 Influence of subjective ankle instability on performances in female collegiate soccer players
Keigo Oda (Japan), T Yamaguchi, K Murakami, Y Takahashi, R Ogaki, T Kurosawa, S Miyakawa

P07.07 Effect of self-reported concussion history on dynamic cerebral blood flow regulation in rugby football players
Akira Kumazaki (Japan), A Hirasawa, S Sakai, S Oghoh, N Hirose

P07.08 Player load monitoring in football: Does body-worn accelerometry predict centre of mass acceleration in football-related movements?
Niels Nedergaard (UK), P Lisboa, B Drust, M Robinson, J Vanrenterghem

P07.09 FMS in sub-elite soccer players: screening and corrective intervention
Lorenzo Francini (Italy), A Chellini, E Tononi, L Lolli, G Galanti

P07.10 Injury risk after returning from concussion in elite rugby players
Matthew J Cross (UK), SPT Kemp, A Smith, G Trewartha, KA Stokes

14:30 - 15:30  P08  TESTING - PART I

Chair: Carlo Castagna (Italy)

P08.01 Relationships between isokinetic knee strength and jump performance in amateur soccer players
Cemal Polat (Turkey), E Akdogan
POSTERS – THURSDAY, 21 MAY 2015

P08.02  The role of hormonal, physical and anthropometric measures in predicting small-sided-games performance in young elite soccer players
Alexandre Moreira (Brazil), RA Rodrigues Lopes, M Lima, M Saldanha Aoki

P08.03  Physical characteristics of Japanese professional soccer players in their senior year: a case control study
Shogo Sasaki (Japan), S Kaneko, K Yagishita, H Horino, T Fukubayashi

P08.04  Diagnostics, level and differences in fitness performance of players from U15 to U21 category
Tomas Maly (Czech Republic), F Zahalka, L Mala, P Hrasky

P08.05  Investigating the use of a Point of Care salivary amylase test in the English Premier League soccer environment
Joe Dunbar (UK), A Jehanli, M Gimpel, G Hazell

P08.06  Prediction of mature stature in adolescent soccer players aged 11-16 y
Dieter Deprez (Belgium), M Coelho-e-Silva, J Valente-dos-Santos, L Ribeiro, L Guglielmo, RM Malina, J Fransen, M Lenoir, R Philippaerts, R Vaeyens

P08.07  Holistic patterns as an instrument to predict performance of promising young football players
Claudia Zuber (Switzerland), M Zibung, A Conzelmann

P08.08  Longitudinal performance development in national youth soccer players
Karin Sonderegger (Switzerland), M Tschopp

P08.09  Relationships between lower body dynamic strength, jump and knee isokinetic parameters of soccer players
Erkan Akdogan (Turkey), C Polat

P08.10  Two seasonal variation in power performance and bilateral force differences in soccer players
Frantisek Zahalka (Czech Republic), T Maly, L Mala

P08.11  Talent development in football and socio-spatial factors as possible key constraints. Towards an ideal training model
Jesús Martínez Martínez (Spain), J Serra-Olivares, JC Pastor-Vicedo, S González-Villora

14:30 - 15:30  P09  TRAINING - PART I
Chair: Magni Mohr (Faroe Islands)

P09.01  Soccer match play and training: a comparison of external training load responses
Stephen Barrett (UK), M Reeves, P Balsoam, R Lovell

P09.02  Changes in the 30-15 Intermittent Fitness Test after two weeks of high intensity pre-season training in elite rugby league players
Vincent Kelly (Australia)

P09.03  The effects of the Dynamic Game Rule in SSGs for soccer
Hamit Cihan (Turkey)
P09.04 Heart rate responses and distance coverage during 1vs.1 duel in soccer: effects of neutral player and different task conditions
Del P Wong (PR China), FM Clemente, A Dellal, FML Martins, RS Mendes

P09.05 Is the 2-a-side soccer game for anaerobic training?
Seonghwan Oh (Germany), U Hartmann

P09.06 Concordance analysis between four commonly used lactate threshold measurements method in professional soccer players
Miguel Valdes (Chile), C Burgos-Jara, C Henríquez-Olguín, R Ramírez Campillo, E Báez, D Zapata-Gómez

P09.07 Difference of time-motion characteristics and heart rate response for 4vs1 small-square possession training between defensive player and possession player in soccer
Kenichi Shibukawa (Japan), H Hasegawa, H Yuda

P09.08 Performance changes after two anaerobic training regimes in soccer players
Andrea Azzalin (Italy), FM Iaia, M Fiorenza

P09.09 Effect of a typical pre-season on anthropometric, aerobic and biochemical parameters in Brazilian futsal players
Ricardo Augusto Barbieri (Brazil), F Milioni, JW dos Santos, NB Nordsborg, M Papoti

P09.10 High intensity training in soccer: does the order of exercises affect responses?
Alexandre Farhi (Qatar), DJ Paul, GP Nassis
FRIDAY, 22 MAY 2015

POSTER SESSION III

12:00 - 13:00  P10  MATCH ANALYSIS - PART II
Chair: Magni Mohr (Faroe Islands)

P10.01 Analysis of teamwork statistical parameters as a key success factor of youth players' development
Roesanggit Prabu (Indonesia), RT Destria, H Maulana

P10.02 A quantitative analysis of penalty kicks in the English Premier League
Paul R Ford (UK), J Gilmore-Jones, AP McRobert

P10.03 The features of attacking tactics in UEFA EURO 2012
Tatsuro Takenaka (Japan)

P10.04 Match-performance analysis of world-leading women's football. Match-up between the United States and Japan
Hiroyuki Horino (Japan), T Tamura, T Takenaka

P10.05 Comparative study of the number of players participating in team possessions of the semi-finalists of the 2014 FIFA® World Cup
Cauan Almeida (Portugal), R Santos, I Teoldo da Costa

P10.06 Fractal analysis of football games in Indonesian super league
Hardani Maulana (Indonesia), RT Destria, R Prabu

P10.07 Comparing the number of passes between the four top teams at the 2014 FIFA® World Cup
Henrique Vianna (Brazil), R Santos, I Teoldo da Costa

P10.08 Short-term peak intensity periods in top-class football games cause fatigue
Dan Fransson (Sweden), M Mohr

P10.09 The effect of performance indicators on the time the second goal is scored in football matches
José Pratas (Portugal), A Volossovitch, A Carita

P10.10 The effectiveness of CD(Combinational Defence) with defender(s) and goalkeeper in soccer
Song-Yi Song (Korea), Y-S Park, H Choi

12:00 - 13:00  P11  TESTING - PART II
Chair: Hiroyuki Nunome (Japan)

P11.01 Determining the influence of 30-day training break on anaerobic capacity in young football players with the Wingate test
Tomasz Gabrys (Poland), A Stanula, M Garnys, U Szmatalan-Gabrys, M Ozimek

P11.02 The influence of physical exercise on the amount of changes in simple reaction time in soccer players
Michal Garnys (Poland), A Stanula, T Gabrys, U Szmatalan-Gabrys

P11.03 Differences in elective response among expert and non-expert footballers
Jose M Moya-Morales (Spain), ROvejero-Mesonero, A Figueiredo, CLalin-Novoa, JCMartinez-Castrejo

P11.04 Test-retest reliability of peak speed and the critical time for recovery
Hubert Mahler (Germany), CHeyde, AGollhofer

P11.05 Relationship between test speeds to evaluate the ability to perform intense performance in soccer players
Thiago Santi Maria (Brazil), J Hespanhol, RLP Silva, MACossioBolaños, MMArruda

P11.06 Effect of the recovery time between sprints during soccer matches
Andrés Vargas Fuentes (Spain), IUibaibarriaga, SG Orozko

P11.07 Evaluation of Yo-yo Intermittent Recovery Test (Level 1), and sprint tests parameters of soccer players
Evrensel Heper (Turkey), BGurol, IYilmaz

12:00 - 13:00 P12 TRAINING - PART II
Chair: Marcello Iaia (Italy)

P12.01 An evaluation of the in-season micro-cycle planning for elite NFL players
Patrick Ward (USA), DRiddle, S Ramsden, T Garcia, B Drust

P12.02 Effect of recreational football on aerobic fitness: a systematic review and meta-analysis
Zoran Milanovic (Republic of Serbia), SPantelic, DCular, GSporis, PKrustrup

P12.03 Is rate of force development related to hop performance in trained soccer players?
Joao Marques (Qatar), DJ Paul, GNassis

P12.04 Training intensity in elite junior soccer: typical week analysis
Antonio Gualtieri (Italy), DFerrari Bravo, RSassi

P12.05 Training intensity in elite junior soccer: weekly and match load
Duccio Ferrari Bravo (Italy), AGualtieri, RSassi

12:00 - 13:00 P13 VARIA - SPORTS MEDICINE
Chair: Carlo Castagna (Italy)

P13.01 League theory: towards the theoretical development of soccer
Ali Reza Nosrati (Iran)

P13.02 Inertial motion analysis in small-sided games
Andrew Guard (UK), NMacFarlane, KMcMillan

P13.03 Quality of tactical behaviours of soccer players according to positional role
Guilherme Machado (UK), MPadilha, I Teoldo da Costa

P13.04 Contribution of effort, self-efficacy and reflection in self-regulated learning among Indonesian National Team U19 football players
Fridondy Prawira (Indonesia), RTDestria, HMaulana

P13.05 Workload and recovery in starters and non-starters in women’s collegiate soccer athletes
Terence Favero (USA), KWinters, KCandhoke
P13.06 Relationship between balance ability and in-step soccer kick maximal ball velocity
Ali Onur Cerrah (Turkey), O Ugurlu, D Simsek, G Yildizer, I Bayram, H Ertan

P13.07 Chronological age relationship with soccer in-step kick ball velocity
Hayri Ertan (Turkey), AO Cerrah, D Simsek

P13.09 Influence of muscular strength and power on tackling ability
Michael Speranza (Australia), T Gabbett, R Johnston, J Sheppard

P13.10 No relative age effect for soccer players according to positional role
Felipe Moniz (Brazil), I Teoldo

POSTER SESSION IV

14:30 - 15:30  P14  PSYCHOLOGICAL PERFORMANCE ISSUES
Chair: Gerarld Gems (USA)

P14.01 Eye tracking in football: effectiveness of visual strategies in dribbling
Alyona Grushko (Russia)

P14.02 Imagery instruction, self-efficacy, and ironic rebound during soccer penalty kick performance
Guido Geisler (Japan), A McCann

P14.03 Visual search behaviors of soccer players in a simulated decision-making task
Takayuki Natsuhara (Japan), M Nakayama, T Kato, T Nagano, T Asai

P14.04 Correlation between the reaction time peripherals stimulus and maturation by soccer players
Eder Gonçalves (Portugal), M Assis, A Figueiredo, I Teoldo da Costa

P14.05 Tactical exploratory behavior in football small-sided games
Lorena Torres Ronda (Spain), Á Ric, R Hristovski, B Gonçalves, L Torres, J Sampaio, C Torrents

P14.06 Analysis of tactical performance according to position role in soccer
Maickel Padilha (Portugal), D Silva, M Andrade, I Teoldo da Costa

14:30 - 15:30  P15  WOMEN'S FOOTBALL
Chair: Tatiana Ryba, (Finland)

P15.01 Young footballers' intention to dope - a cross-cultural comparison between female and male elite players in the UK, Denmark and Greece
Eleftheria Morela (Denmark), M Kavussanu, A-M Elbe, A Hatziegeorgiadis

P15.02 The female soccer from periphery to center: professionalization of women's soccer players in São Paulo city
Mariane Pisani (Brazil)

P15.03 Representation and stylization: girls' and women's football in and the Dutch media
Astrid Cevaal (The Netherlands)

P15.04 Size of ball in women's football: influences in dribbling and kicking tasks
Angelique Girard (France), S Ciavaldini-Cartaut, J-M Garbarino

P15.05 A comparative analysis of motivation levels for success among female football team players in different leagues
Asuman Dýrmen (Turkey), V Kücük

P15.06 The gendered play: women’s football in Turkey
Pinar Öztürk (Turkey), C Koca

14:30 - 15:30 P16 PSYCHOLOGY
Chair: Natalia Stambulova (Sweden)

P16.01 Perfectionist cognitions in soccer
Tracy Donachie (UK), E Smith, HK Hall, AP Hill

P16.02 ‘I was destroying it all’: a study of the identity construction and impact among elite youth footballers in England
Chris McCready (UK)

P16.03 A study of the migratory transition of elite Japanese soccer players
Kanshi Uemukai (Japan), N Kawada, Y Iida, D Richardson, M Littlewood, M Nesti

P16.04 Volitional skills predict attendance rates in a football training intervention
Svein Barene (Norway), P Krustrup, A Holtermann, A-M Elbe

P16.05 “Football is my life”: a reflective account of how emotional regulation can have a positive impact on elite performance
Amy Spencer (UK), A Wilding, J Page

14:30 - 15:30 P17 PEDAGOGICAL ISSUES, COACHES AND TEAM PROCESS
Chair: Donna O'Connor (Australia)

P17.01 Design and explanation on rating evaluation standard of students' football motor skills (RESSFMS) in China
Huilin Wang (China), ZY Liu, W Yan, Y Li, Y Qin, YY Lei, WY Ren

P17.02 Development of evaluation methods for ball possession skills in college soccer players
Hiroshi Yamada (Japan), Y Hayashi, Y Kitamura, K Fukui

P17.04 Life stories of practical wisdom coaching methods used by youth team coaches at a J. League Academy who train players (former J. League soccer players)
Midori Haramaka (Japan), M Mori, M Koido, M Nakayama, T Asai

P17.05 The dimensions of the athlete-coach relationship in amateur and professional soccer players
Veysel Kücük (Turkey), S Tarakci
P17.06 Growth model: development trends of National School Football League from a review of the campus football in China  
Zhiyun Liu (China), H Wang, W Yan, Y Li, Y Qin, WY Ren, Z Tian, W Wang

P17.07 Interactive object to enhance the process of teaching-learning-training of tactics in soccer: the case of Sphero™  
Grégory Hallé Petiot (Brazil), V Lehmann, I Teoldo da Costa

14:30 - 15:30 P18 VARIA - SOCIAL SCIENCE AND HUMANITIES  
Chair: Laila Ottesen (Denmark)

P18.01 Narrative interview about the influence of being on the homeless national Danish football team  
Andreas Bjerregaard (Denmark)

P18.02 Impact of established clubs on probability of survival in top leagues  
Rob Gandy (UK), AP McRoberts

P18.03 Developing elite footballers in China: the role of family, education & coaching on the development of youth talent  
Shunhao Jia (UK), M Toms

P18.04 Football as a peace ambassador - towards a United Football Federation in Cyprus  
Mustafa Ferit Acar (Turkey), C Keles, O Atalag

P18.05 Big data in the EPL: a peripheralization of football’s core?  
George Kioussis (USA)

P18.06 Preventing sports injuries among young footballers  
Dominic Uzodimma Ikwuagwu (Nigeria)
INFORMATION TO PRESENTERS

Speakers’ Preview Room
The speakers’ preview room is located in Room 6 in the DGI-Byen’s Congress Center.

Opening hours:
Wednesday, 20 May 2015  12:00 - 15:45
Thursday, 21 May 2015   08:30 - 15:45
Friday, 22 May 2015     08:30 - 17:15
Saturday, 23 May 2015  08:30 - 10:30

Oral presentation
Oral sessions will take place in Session Rooms 1-5 on the ground floor and on second floor.

Speakers are requested to present themselves to the chair in the lecture room 10 minutes prior to the beginning of their session.

Please respect the time limits. Each free paper presentation is scheduled to last for 13 minutes, which means approx. 10 minutes for the presentation leaving 3 minutes for Q & A. Each invited presentation is scheduled to last for no more than 28 minutes including questions. The session chair is responsible for the time table and will interrupt if a presentation extends beyond the allocated time. There will be a technician available in or near to the auditorium.

Poster exhibition and presentation
Posters will be placed in the Poster Hall on first floor and in the Lounge on second floor.

The poster exhibition will take place from Thursday 21 May 9:00 until Friday 22 May 18:15 and will be divided in two parts. There are two dedicated Poster Sessions on Thursday and two on Friday.

You have been assigned a poster board number, date and time. You are expected to be at your assigned space on the day that your poster presentation is scheduled. Senior Researchers will act as Poster Chairs during the poster sessions. They will make a poster round and chair short discussions with the poster presenters.

Posters should be mounted before 09:00 on the day of your presentation and MUST BE taken down on the same day. The remaining posters will be destroyed afterwards.
GENERAL INFORMATION

Venue
DGI-Byen CPH Conference
Tietgensgade 65, 1704 Copenhagen V, Denmark
http://www.dgi-byen.com
(Entrance from Kvægtorvsgade)
Tel. +45 70237823 (Congress registration desk)

Registration desk
The Registration desk is located in the Foyer, ground floor in the DGI-Byen CPH Conference.

Opening hours:
Wednesday, 20 May 2015 09:00 – 17:30
Thursday, 21 May 2015 08:00 – 17:00
Friday, 22 May 2015 08:30 - 18:15
Saturday, 23 May 2015 08:30 – 13:00

Abstracts
The compilation of abstracts is published on the congress website. You can also download the abstracts on the congress app.
SOCIAL EVENTS

Welcome reception at Copenhagen City Hall (20 May 2015, 18:30 – 19:30)
The City of Copenhagen welcomes the WCSF2015 participants. Enjoy the beautiful surroundings at Copenhagen City Hall while greeting and networking with your colleagues from around the world, and tasting the renowned City Hall pancakes. Spouses are welcome.

Important: Only delegates with ticket will be allowed entrance to the City Hall. Find your ticket in your personal envelope.

Boat tour to Copenhagen’s best sights and attractions (20 May 2015, 20:00 – 21:00)
Enjoy a guided tour around the harbor and through the idyllic canals and hear about Copenhagen's beautiful churches, castles, old listed houses, new buildings and other sights of interest. Spouses are welcome.

Price: 10 €. Find your ticket in the congress bag or buy one at the Congress registration desk before 20 May at 17:00.

Football tournament (21 May 2015, 18:00 – 20:00)
Join for a social tournament and a competitive tournament, and enjoy the football game together with your colleagues. Become introduced in the warm up to the Danish Football Association’s initiative “Football Fitness”: Effective, social and fun football exercise.

Sign up via the website or at the Congress registration desk before 20 May at 17:00.

Younger researchers get-together: Local Danish beer (21 May 2015 at 21:30)
The younger researchers are invited for an introduction to “Local Danish beer” and the scene of microbrewery in Denmark. Prepare to taste a selected number of local beers.

Price: 15 EUR / 120 Danish Kronor. Please pay cash upon arrival at the congress registration desk before 21 May at 17:00.

Congress dinner with a taste of Danish cuisine (22 May 2015, 19:30 – 24:00)
Join your colleagues from around the world in a festive and informal evening, and enjoy delicious foods with a selection of Danish inspired dishes. The congress dinner takes place at the top floor of the congress venue. The evening will include a 3 course dinner, coffee and entertainment. Beverages can be purchased from the bar. Spouses are welcome.

Please, find your ticket in your personal envelope if you already registered. Limited extra tickets are for sale before 21 May at 12:00.

Price: 45 €. The price is excl. beverages.
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WCSF2015 also received funding from the Danish Ministry of Culture
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EXHIBITION FLOOR PLAN
KP01.1
The 20 years of F-MARC
Jiri Dvorak
FIFA Medical Assessment and Research Centre (F-MARC), Schulthess Klinik, Zurich, Switzerland

F-MARC, FIFA Medical Assessment and Research Centre was established in 1994 as an independent academic institution to serve the needs of FIFA and its Confederation’s aiming to improve the game of football and also to promote football as a health enhancing leisure activity.

The philosophy of prevention was the main focus of all activities developed by F-MARC. The number 11 (11 players) became synonymous for prevention:

- 11+ complete warm up programme - to prevent injuries
- 11 steps - to prevent sudden cardiac arrest
- 11 rules - to prevent doping in football
- 11 for health - to prevent communicable and non-communicable diseases

With particular reference to the last point, it must be noted that the strategy has changed from “Medicine for Football” to “Football for Health”. Using the powerful platform and popularity of football, F-MARC disseminate educational health messages combined with physical activity while playing football, in a simple yet effective school-based programme contributing to the improvement of public health and promoting a healthy life-style.

The FIFA Congress, the supreme governing body supported the notion of President Joseph S. Blatter to implement the “FIFA 11 for Health” programme as a “FIFA Global Health Initiative”. The programme is currently being run in 20 counties, namely Africa, South America, Asia and Oceania. The same approach has been used in a fast track action “11 against Ebola” contributing to the reduction of new infections in West Africa 2014/2015.

To disseminate the educational messages as well as improve the quality of “Football Medicine” 42 FIFA Medical Centers of Excellence have been accredited around the world, currently developing Diploma in Football Medicine to improve the medical care for footballers around the 209 national member associations.
Playing football to prevent chronic diseases

Peter Krstrup(1,2)
(1) NEXS, University of Copenhagen, Department of Nutrition, Exercise and Sports, Copenhagen, Denmark
(2) Sport and Health Sciences, College of Life and Environmental Sciences, University of Exeter, Exeter, UK

It is now well-known that physical training is a cornerstone in the prevention and treatment of lifestyle diseases and it has recently been concluded that sport participation reduces all-cause mortality by 20-40% (Khan et al. 2012). Over the last five years, more than 70 scientific articles have described the activity profile, physiological demands, fitness effects and health benefits of recreational football for untrained individuals across the life span, documenting that small-sided football (3v3 to 7v7) has broad spectrum fitness and health effects for 6-80-year-old participants, as it combines elements of high-intensity interval training (HIIT), endurance training and strength training (Krstrup et al. 2009, 2010, 2014, Randers et al. 2012). Recently, we investigated the health effects of football for patient groups with hypertension, type 2 diabetes and prostate cancer. Just 3 months of football training, 2x1 hour/week, lowered systolic and diastolic blood pressure by 12/8, 8/8 and 11/9 mmHg, respectively, in three RCT’s, which is a more pronounced effect than usually seen after 3-6 months training interventions (Krstrup et al. 2013). Twice-weekly 45-60-min football sessions over 3 months was also shown to increase lean body mass, muscle strength and bone mass for elderly men with prostate cancer undergoing androgen deprivation therapy (Uth et al. 2014, 2015). These results and other recent results will be presented at WCSF2015, altogether providing evidence that recreational football is an effective type of HIIT training that can improve fitness and serve as effective prevention, treatment and rehabilitation of noncommunicable diseases for individuals across the life span.

Football and health from a social science perspective

Laila Ottesen
NEXS, University of Copenhagen, Department of Human and Social Sciences, Copenhagen, Denmark

The sporting landscape is changing and the Danish welfare state is placing new demands on "The Danish sports model" - the sports organizations and associations - especially in order to increase the third sector's role in health promotion purposes. The Danish Football Association has launched a new concept called "Football Fitness" with a focus on the health dimension of football, both of physiological, psychological and social nature, rather than a focus on the competition aspect or the actual game. FF can be seen as a unique case showing how these new health claims are implemented and adapted in the Danish Football Association and the football clubs. Currently the concept is in the implementation phase in more than 200 clubs, and is predominantly targeting inactive adult user groups (female and male), new to the clubs.
Copenhagen Centre for Team Sport and Health is an interdisciplinary research unit with heavily evident based physiological knowledge about football as a health promoter. But to make this knowledge work it has to be implemented in the real world and in that process one needs sociological theory. A wide range of stakeholders (both researchers and practitioners) engaged in health policy emphasize the need for knowledge about how to anchor health related interventions intended to promote physical activity and ask how such interventions should be organized and implemented to be applicable in practice. The research project about Football Fitness, based on many years of social science research and an ongoing PhD project, is a unique opportunity to access the knowledge of how the concept "Football Fitness" is organized, implemented and adapted in the participating clubs. And consequently gain knowledge of what may promote a successful implementation not only in the organizations and clubs but also in the lives of the players/participants. This knowledge is of great importance in relation to welfare/health policy by answering the question of whether and how it is possible to make health related changes in the Danish sports model. If this sports model with its principles such as democracy, voluntarily work and social capital can cope with the health issue as Football Fitness is an example of, then it is worth considering it to be a model to export internationally.

15:45 - 17:30
S01 INJURIES - PART I

S01.1
Injuries in top class football- coaches are more important than doctors?
Jan Ekstrand
Linköping University, Department of Medical and Health Sciences, Division of Community Medicine, Football Research Group, Linköping, Sweden

Injury study is the first step in injury prevention. The UEFA Champions League injury study is ongoing since 14 years and includes information from 55 elite level clubs in Europe. The database, consisting of 20 000 injuries is the world's largest concerning male elite level football. A large database from a homogenous material provides robust information of the risk of specific injuries, their consequences in form of lay off days and the risk of recurrence etc. Further, injury studies provides an instrument to follow injury rates over time and to evaluate the effect of preventive programs or change of factors such as rules, match frequency or training load.

S01.2
Biceps femoris long head architecture and hamstring injuries in elite soccer
Ryan Timmins(1), M Bourne(2), A Shield(2), M Williams(3), DA Opar(1)
(1) Melbourne School of Exercise Science, Australian Catholic University, Australia
(2) School of Exercise and Nutrition Sciences and Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Australia
(3) School of Health, Sport and Professional Practice, University of South Wales, Pontypridd, Wales, UK
Introduction and purpose: The biceps femoris long head (BFllh) is the most commonly injured hamstring muscle. It is known that BFllh architecture is different in those who suffer a hamstring strain injury. However, it is not known if these differences are evident prior to a hamstring strain injury occurring.

Method: Elite Australian soccer players (n=171) from eight teams in the elite Australian soccer league participated in this prospective cohort study. The architectural characteristics of the BFllh were assessed using two-dimensional ultrasonography at rest and during 25% of a maximal voluntary isometric contraction during early preseason. Medical staff provided prospective injury details as they arose.

Results: Elite soccer players who suffered a hamstring strain injury during pre-season and the first 9 rounds (n=18) had shorter BFllh fascicles and greater BFllh pennation angles when assessed at rest and during 25% of a maximal voluntary isometric contraction (p<0.05). BFllh muscle thickness was not significantly different between the two cohorts (p>0.05).

Conclusions: Elite Australian soccer players who suffer a hamstring strain injury have shorter BFllh fascicles and greater pennation angles when assessed at rest and during 25% of a maximal voluntary isometric contraction compared to the athletes who remain uninjured. These findings indicate that BFllh muscle architecture may influence hamstring strain injury risk in elite soccer players.

S01.3
Eccentric hamstring strength and injuries in elite soccer: a prospective study

R Timmins(1), M Bourne(2), A Shield(2), M Williams(3), David A Opar(1)

(1) School of Exercise Science, Australian Catholic University, Melbourne, Australia
(2) School of Exercise and Nutrition Sciences and Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Australia
(3) School of Health, Sport and Professional Practice, University of South Wales, Pontypridd, Wales, UK

Introduction and purpose: Hamstring strain injuries (HSI) are the most common non-contact injury in elite soccer. The Nordic hamstring exercise (NHE) has been shown as an effective exercise in reducing the risk of a HSI. However, it is unknown if measures of eccentric strength during the NHE, when assessed in early pre-season, are different in soccer players who suffer a HSI compared to those who remain uninjured.

Method: Elite Australian soccer players (n=147) from eight teams in the elite Australian soccer league participated in this prospective cohort study. Eccentric strength during the NHE and maximal isometric knee flexor strength were assessed during early preseason. Medical staff provided prospective injury details as they arose.

Results: Elite soccer players who suffered a HSI during pre-season and the first 9 rounds (n=18) were weaker during the NHE than those who remained uninjured (255.9N ±86.2 vs 300.1N ±73.4;p=0.023). Maximal isometric knee flexor strength, between limb imbalance during the NHE or during maximal isometric knee flexion were not significantly different in those who suffered a HSI compared to the uninjured cohort (p>0.05).

Conclusions: Elite Australian soccer players who suffer a HSI have lesser eccentric strength in early preseason, when compared to athletes who remain uninjured. Measures of isometric strength or
between limb imbalances were not different between the two cohorts. This evidence suggests that low eccentric strength may contribute to the occurrence of a HSI in elite soccer players.

S01.5
Accumulated work loads and injury risk in elite youth football players using GPS technology
Laura Bowen, F-X Li
The University of Birmingham, Department of Sport, Exercise and Rehabilitation Sciences, Birmingham, UK

The use of global positioning systems (GPS) in football has provided a method of objectively quantifying player exertion and physical stress. However, the potential of GPS as an injury prevention tool is yet to be fully examined. The purpose of this study was to investigate the relationship between accumulated physical work load (GPS/accelerometer derived) and injury risk in elite youth football players (n=22). Work load data and non-contact, soft tissue injury incidence were monitored throughout an entire season. Multiple regression was used to compare cumulative (1-,2-,3- and 4-weekly) absolute and relative (based on individual match values) loads between injured and uninjured players for specific GPS and accelerometer derived variables: total distance (m), high speed distance (m), equivalent metabolic distance (m), speed intensity (AU) and total load (AU). Odds ratios were calculated to determine the relative injury risk. Cumulative 4-weekly load showed the strongest significant relationship with greater injury incidence in all variables measured except high speed distance, were 1 weekly load showed the strongest relationship with injury risk. Four-weekly relative total load was associated with the greatest significant injury risk (OR = 9.149, p<0.001). Strong correlations were found between all variables selected (p<0.001). In conclusion, accumulated GPS/accelerometer derived variables significantly relate to injury risk in elite youth football players, and should therefore be considered when monitoring work loads for optimal performance and injury avoidance.

S01.6
Is eccentric knee flexor strength prioritised at elite levels of football
Steven Duhig(1), M Bourne(1), DA Opar(2), A Shield(1), R Timmins(2)
(1) Queensland University of Technology, School of Exercise and Nutritional Science, Kelvin Grove, QLD, Australia
(2) Australian Catholic University, School of Exercise Science, Fitzroy, VIC, Australia

The Nordic hamstring curl (NHC) has been shown to reduce injuries across football codes. Furthermore, low forces produced during the NHC are effective in estimating future risk of hamstring strain injury (HSI). Objectives: 1) To describe the knee flexor forces produced during the NHC across elite and sub-elite levels of Australian Rules football (ARF), rugby union (RU) and rugby league (RL). Methods: A total of 626 male footballers performed 3 maximal NHCs with the peak force recorded. Knee flexor force was measured during the NHC via load cells attached to ankle straps. Results: Peak knee flexor forces are as follows; ARF (n=378) 362N ± 84 and 338N ± 59; RU (n=179) 346N ± 76 and RL (n=98) 423N ± 86 and 352N ± 74, elite and sub-elite respectively. In general, RL footballers were significantly stronger (p<0.01) than their AFL and RU
counterparts. However, no significant strength difference was observed between the AFL and RU codes (p>0.05). A comparison between the elite and sub-elite levels of each code found only the elite RL group being significantly stronger than the sub-elite group (p<0.01). Conclusions: Eccentric knee flexor strength has been identified as a risk factor for HSI. Therefore, as elite athletes are exposed to higher training loads and greater physical demands they should also acquire a level of strength to cope with these increased stresses.
**S02.1**

**Physical capacity and match running performance in very young soccer players**

*Giuseppe Bellistri(1,2), L Sodero(2), M Ramaglia(2), C Sforza(1,2), M Marzorati(2), S Porcelli(2)*

(1) Department of Biomedical Sciences for Health, Università degli Studi di Milano, Milan, Italy  
(2) Institute of Bioimaging and Molecular Physiology, Consiglio Nazionale delle Ricerche, Segrate (MI), Italy

Aim: The aim of this study was to analyze match running performance in relation to age and individual physical capacity in youth soccer players aged 8-10 years.

Methods: Physical capacity of 12 under-10 (U10) and 15 under-8 (U8) male players was assessed by counter movement jump (CMJ), 20 meter shuttle run (20m-SR) and 10, 20 and 30 meters (10m, 20m and 30m) sprint tests. Shuttle dribble test (SHD) and slalom dribble test (SLD) were also performed to evaluate technical ability. Time motion analyses by global positioning system (K-Gps 10Hz, K-Sport) were performed during 30 (200 observations) official matches (lasting three equal periods of 15-min).

Results: U10 vs U8 showed a better shuttle-running performance (1215±77 vs 872±78m, p<0.005), a lower sprint time on 20m (4.15±0.05 vs 4.38±0.07s, p<0.05) and 30m (5.72±0.06 vs 6.31±0.08s, p<0.0001) and a better technical ability (SDL: 10.7±0.2 vs 11.8±0.2, p<0.001; SHD: 22.3±0.3 vs 29.4±0.7s, p<0.0001). No differences were observed in CMJ and 10m. U10 covered higher total (3437±137 vs 2348±124m, p<0.0001) and high-intensity distance (1455±104m vs 992±116m, p<0.005) than U8. Distance covered at high-intensity in the third time was not significantly different from first and second time both for U10 and U8. A linear relationship (r²=0.74, p<0.0001) was observed between high-intensity distance and 20m-SR.

Conclusions: This is the first study characterizing the match running activity of very young soccer players. If confirmed in a larger population, these data could be used by coaches and support staff as starting point in the design of training programs.

**S02.2**

**Capturing team identities in soccer through playing style analysis**

*Hector Ruiz(1,2), P Lisboa(2), P Neilson(1), W Gregson(3)*

(1) Prozone Sports Ltd., Performance Lab, Leeds, UK  
(2) Liverpool John Moores University, School of Computing and Mathematical Sciences, Liverpool, UK  
(3) Liverpool John Moores University, The Football Exchange, Liverpool, UK

Legendary soccer teams are not remembered solely for the titles won, but also for the way they played the game. The Dutch total football, the Spanish tiki-taka, or Mourinho’s lightning-fast counter-attacks are examples of signature styles that are as big a part of those teams’ identities as the badge on their shirts. Playing styles are a recurrent topic in soccer conversations, yet there is no agreed definition of what they are. How long must a long ball be? What exactly constitutes build-up
play? Consequently, we cannot accurately measure how prone a team is to play a certain style or how important each player is in such context. We consulted experts at elite soccer clubs to develop playing style definitions that measure the traits they look for when they analyse tactical performances. The result is a rule-based framework that objectively quantifies collective playing style prevalence following a bottom-up approach based on raw event data, which means that the level of analysis can go from detailed information about a specific pass to a summarised view of a complete season. The proposed methodology adds a new dimension to the analysis of soccer, with impact in areas like metric development, opposition scouting and profiling of players and managers. In this talk, we apply it to historical EPL data to study the influence of new managers on the playing profile of their teams. The results highlight which managers posed a significant shift from the previous style and provide an insight into how they did it.

**S02.3**

**Development of high-precision tracking system for soccer player analysis by using computer vision techniques**

*Ayano Souma, K Sakaue, S Ishizaki*

*Shibaura Institute of Technology, Department of Mechanical Engineering, Tokyo, Japan*

Recently, tracking systems based on computer vision techniques have been used for the tactical analysis and the assessment of the ability of soccer players. However, the tracking systems, especially commercially available systems, are rarely used because of high cost. Therefore, the authors proposed an inexpensive tracking system using particle filter method. The proposed system can measure the position, the velocity and the distances covered of soccer players during a match. However, this system could not obtain repeatable results because particle filter uses random prediction for the tracking. Furthermore, even if the player stands still, the tracked position slightly fluctuates. Therefore, the accuracy of velocity is not high. The present study developed the new high-precision tracking system by using deterministic image processing methods instead of the particle filter. The used method don’t use the random prediction, therefore the repeatable results can be obtained. The new system is applied to evaluate 14 players who played in 90 minutes of a game. The tracking is carried out every 1/20 seconds. From the tracking results, it is confirmed that the present system can obtain the same tracking trajectories as that by the previous system. Moreover, the fluctuation of the tracking trajectories is reduced. Therefore, the accuracy of the player velocity is remarkably improved. These facts mean that the present system is thought to be useful method to evaluate the ability of the soccer player during a match.
S02.4
Differences in high-intensity running, metabolic power, accelerations and decelerations between football players of high and low performing teams
Ermanno Rampinini(1), DR Connolly(1), M Riggio(1), A Bosio(1), R Sassi(2), AJ Coutts(3)
(1) Human Performance Laboratory, MAPEI Sport Research Centre, Olgiate Olona (Varese), Italy
(2) Training Check Juventus, Juventus Football Club, Turin, Italy
(3) School of Leisure, Sport & Tourism, University of Technology, Sydney, Lindfield, Australia

The aim of this study was to compare the match physical activity profiles of Italian Serie A football players of different competitive level (Top and Bottom, ranked in the first and last five league positions respectively). A video match-analysis system was used to monitor 136 players during 235 individual games. The variables considered were: total distance (TD), distance covered above 15 and 20 km•h⁻¹ (DS15 and DS20), equivalent distance (ED), distance covered above 20 and 25 W•kg⁻¹ of metabolic power (DP20 and DP25) and distance covered at different intensities of accelerations or decelerations. The number of goals scored and conceded was also examined. Match data was divided into 15-minute periods for the analysis. Significant group x game period interactions were found for TD (p=0.002), ED (p=0.008) and DS15 (p=0.009). TD and ED were 3-4% higher (p<0.05) for Top players during 15-30, 30-45 and 60-75 min periods. Top DS15 was higher (p<0.05) during the first half (12-14%). DS20, DP20 and DP25 were higher for Top independently of the game period (p<0.05). No significant differences were found for accelerations or decelerations (p>0.083). Goals scored were 4-5 times higher (p<0.05) for Top teams during 15-30 and 30-45 min periods, whilst goals conceded were 2-8 times higher (p<0.05) for Bottom teams during 15-30, 30-45 and 75-90 min periods. This study showed greater physical activity profiles by Top players, particularly during the first half. Future studies should further investigate the possible influence of players’ physical activity on the teams’ goal dynamics during matches.

S02.5
Influence of styles of play on possession performance indicators in elite soccer
Javier Fernandez-Navarro(1,2), L Fradua(1), AA Zubillaga(3), O Caro(1), AP McRobert(2)
(1) University of Granada, Department of Physical Education and Sport, Granada, Spain
(2) Liverpool John Moores University, Research Institute for Sport and Exercise Sciences, Liverpool, UK
(3) University of the Basque Country, Department of Physical Education and Sport, Vitoria-Gasteiz, Spain

Soccer teams use different attacking styles of play in competition. The aim of the present study was to examine the influence of soccer teams’ styles of play on possession performance indicators. Data from ninety-seven matches, involving 37 different teams from 1st Spanish La Liga and the English Premier League (2006-2007 and 2010-2011) were collected using a multiple-camera match analysis system (Amisco Pro®, version 1.0.2, Nice, France). Factor analysis was performed to classify teams based on the styles of play they use. Eighteen teams employed the direct style of play and nineteen teams used the possession style of play in attack. Six performance indicators associated with ball possession and pitch location were measured and compared across the groups. There were
significant differences between direct and possession style of play teams across three performance indicators. Possession of the ball (P<0.001) and possession of the ball in the central areas (P<0.01) were greater for possession teams (53.42±5.65% and 60.59±3.55%) compared to direct teams (43.53±3.36% and 55.96±5.61%). Possession of the ball on the sides (P<0.01) was lower for possession teams (39.41±5.55%) compared to direct teams (44.05±5.61%). No significant differences were observed for possession of the ball in the defensive, middle and attacking thirds of the pitch. These findings suggest that values for possession performance indicators vary depending on the styles of play that soccer teams use in competition. Future research should consider styles of play employed by teams when measuring performance indicators from match play.

S02.6
Pass appearance time and pass attempts by teams qualifying for the second stage of World Cup 2014 in Brazil

Kaori Saito
Sakuragaoka Junior-High High School, Department of Sports and Health, Physical Education, Tokyo, Japan

Introduction: Today, are Ball possession and passing football key concepts in a modern football? I announced about the passing tendencies in actual games in WCSF 2011. This study aims to verify the difference between the not qualified teams and the qualified teams to the 2nd stage in the passes attempts and the Pass Appearance Time at all group stage matches of World Cup 2014. It verifies how modern football tactics about passing football have been changed.

Methods: Actual playing time is represented as Net Playtime in this study. Pass Appearance Time is calculated by Net Playtime divided by passes attempts. Pass Appearance Time of each team for all Group stage matches was calculated and the analysis of all Group stage matches was done. It is the same way as WCSF 2011, compared with World cup 2010.

Results & Discussion: It is found out that the data of 2014 did not show the difference between qualified teams and not qualified teams, though the data of 2010 show the significant differences about those.

Conclusion: In World cup 2010, it is suggested that increasing passes attempts and lessening Pass Appearance Time are effective in order to qualify to the 2nd stage. However in World cup 2014, it is suggested that only passing tactics is not effective in order to qualify to the 2nd stage. It is suggested that diversity of tactics is important to do so.

Keywords: Pass Appearance Time, Passes attempts, Net Playtime, Group stage matches

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<th>Table 1: Compare 2014 with 2010 for Group stage result for Net playtime, pass attempts and Pass Appearance Time</th>
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S03.1 Are acceleration and jumping related to goalkeeper-specific testing?

Ricardo Rebelo-Gonçalves(1), AJ Figueiredo(1), J Valente-dos-Santos(1), MJ Coelho-e-Silva(1), A Tessitore(2)

(1) Faculty of Sports Science and Physical Education, University of Coimbra, Coimbra, Portugal
(2) University of Rome “Foro Italico”, Rome, Italy

The purpose of this study was to identify the associations between acceleration, vertical jump, horizontal jump, and goalkeeper-specific technique. This study comprised 28 young soccer goalkeepers (age 14.98 ± 2.43) with a minimum of 3 years of goalkeeper training experience. Goalkeepers were grouped according to age category and evaluated for 5-m and 10-m sprint, standard and free arms countermovement jump, and 5-jump test performance. Goalkeeper-specific diving technique was assessed using two protocols: the Sprint-Keeper Test (S-Keeper) and the Lateral Shuffle-Keeper Test (LS-Keeper). Pearson's correlation examined the association between acceleration, vertical jump, horizontal jump and goalkeeper-specific age-adjusted z-scores. Coefficients of variation for the S-Keeper showed that these scores shared 24.1%, 20.0% and 32.7% common variance, respectively. In the LS-Keeper common variance was 4.0%, 0.2% and 18.1%. Correlations were re-analyzed after controlling for percentage of attained mature stature, considering all single variables and diving side. No significant association was consistently found across age-groups. Although not significantly, a change in the general trend was observed in the U15, when compared to U13, U17 and U19. Also, a particular asymmetry was noted for 10-m sprint in both protocols among U15 goalkeepers. Based on the low coefficients of determination, it was concluded that acceleration, vertical jump, horizontal jump and goalkeeper-specific technique are specific qualities and relatively unrelated. These findings suggest that different quantitative and qualitative adaptations are required to perform a diving technique. The identification and optimization of such elements can inform coaches and goalkeepers about good patterns movements, takeoff movements and asymmetries between diving sides.

S03.2 Coaches perceived vs. true ranking of physical fitness in U19 youth football players

Michael Rumpf
Aspetar - Qatar Orthopaedic and Sports Medicine Hospital, Doha, Qatar

Research recently questioned if fitness testing in football would provide meaningful and new information to coaching staff or if it would only confirm coaches’ subjective impression of the players’ fitness and furthermore playing performance. The purpose of this study was to determine the differences between the coaches perception and the actual measured ranking of U19 youth football players in Qatar players in the 30-15 fitness test and a 40-meter sprint test. Eleven U19 youth football players (height 174 (± 5.41 cm; weight 68.4 (± 10.0 kg) from a Qatar Stars League team were. Before testing, the head coach of the team was asked to rank each player for both tests.
Testing was conducted during the competitive season, however, was placed into mid-week, to avoid possible fatigue. A Spearmans rank correlation was used between subjective coach ranking and actual physical performances. Coaches perception and actual fitness ranking was correlated for 30- and 40-meter sprint performance, as well as for maximum speed. Spearmans rank correlation coefficient and p-values were >0.609 and <0.047 respectively. Coach’s perception of players’ fitness was significant correlated for general sprint performance and maximal speed, however, not for specific abilities (such as acceleration) and 30-15 fitness test performance. It seems that fitness testing of Qatar youth players not only provide coaches with already known, but also with additional information that might change coach’s perception of the players. This should be confirmed with other groups as well.

S03.3
Comprehensive performance test battery protocol of elite academy soccer players. Prospective and position specific evaluation
David Zalai, I Csaki, Z Holanek, S Safar, T Halmai
Hungarian Football Federation, Strength & Conditioning - Rehabilitation & Methodology Center, Budapest, Hungary

Introduction: Football performance, prevention and science have grown immeasurably over the past few years. The periodized objective test offers important information about players’ performance. The collected data can be used for identification of talented players. It is also helpful to adjust strength and conditioning programmes for the professionals.

Methods: 66 elite academy soccer players from U16 to U21 performed the program. All players were entered in to the integrated and progressive 4-phase human biology and performance system. The segmental body composition was assessed by using the multi-frequency bioimpedance analyser (Inbody 230). Functional core performances and injury risk factors were evaluated using the Functional Movement Screen scoring system and the Y-Balance test lower extremity protocol. We examined the following measurements: anaerobic counter movement jump, linear speed (5m, 10m, 30m), agility (Arrowhead Agility and Illinois Agility) and aerobic (Yo-Yo IR1) performances.

Results: We found strong correlations between the parameters of the agility tests using Pearson product correlation coefficients (<0.05). We uncovered statistically significant differences between the FMS main scores in relation to player’s specific position. Examination of our study group revealed 50% incidence of lower extremity functional asymmetry.

Discussion & Conclusion: The comprehensive test battery plan provides an enhanced examination system from general basic tests to the sport and position specific evaluations. The multifactorial scientific analysis of the objective data assists to establish the foundation of the relevant developmental and training programmes in order to minimise the risk of non-contact injuries and to augment high level of physical performance.
S03.4
Expert oriented analysis of football duels by means of position data
Roland Leser(1), T Hoch(2), B Moser(2), A Baca(1)
(1) Center for Sport Science and University Sports, University of Vienna, Austria
(2) Software Competence Center Hagenberg, Austria

This study aimed to analyse 1 versus 1 duel situations in football. Therefore, 77 duels of elite youth players were videotaped and recorded with the LPM position tracking system. By means of expert interviews and content analysis the process and variables for assessing the players performance in the perspective of coaches was gathered. The experts’ knowledge led to a kinematic model distinguishing 3 keypoints (start, confrontation, shot) and 2 phases (phase 1: start to confrontation; phase 2: confrontation to shot). for each of the keypoints and phases a series of kinematic parameters were calculated (e.g., distance between the players at the keypoints, maximum speeds during the phases). Summarised, in 36% of all duels the attacker could not pass the defender at the confrontation keypoint. In 64% of all duels the attacker was able to pass the defender, but only 43% led to a shot (21% of the duels led to a lost ball in phase 2). When the attacker was not able to pass the defender the most important factor was an active turnover through the defender (70%) followed by hesitant attacker movements (15%) and others (15%). The most crucial kinematic parameter distinguishing between successful and unsuccessful confrontations was the acceleration of the attacker at the moment when he tried to steer in one direction (either left or right) and thereby tried to pass the defender (p>0.01). Our results show that performing dynamical movements at proper moments is a key factor for successful 1 versus 1 duels in football.

S03.5
Testing modality affects vVO2max assessment in soccer players and long distance runners
Andrea Riboli, E Limonta, E Cè, M Venturelli, G Alberti, F Esposito
Department of Biomedical Sciences for Health (SCIBIS), Università degli Studi Di Milano, Milano, Italy

The aim of the study was to determine the effect of testing modality on the assessment of the running velocity associated with maximum oxygen uptake (vVO2max) in soccer players (SOC) and runners (RUN). To this purpose, nine SOC and eight RUN reported to the laboratory twice to perform two maximum treadmill incremental tests for VO2max and vVO2max assessment: an incremental continuous ramp test (Ramp; 1 km/h per min) and an incremental discontinuous square-wave test (SW; 5 workloads of increasing intensity of 4 min each, with 5 min of rest in between), in random order. At rest and during exercise, cardiorespiratory and metabolic variables were collected breath-by-breath. Blood lactate concentration [La-] was measured at rest and at peak exercise. No differences between protocols were found in VO2max and in the other cardiorespiratory and metabolic variables at maximum exercise in both groups. On the contrary, vVO2max was higher in Ramp than SW in both groups (SOC: 15.1±0.2 vs 19.4±0.4 km/h; RUN: 18.8±0.5 vs 22.1±0.3 km/h, for SW and Ramp, respectively; P<0.05), with a larger difference between Ramp vs SW in SOC than in RUN (+29% vs +18%, respectively; P<0.05). Despite similar VO2max values, vVO2max was higher in Ramp than in SW, indicating that SW should be preferable in vVO2max.
assessment, especially in SOC. These differences between protocols should be acknowledged when determining training workloads based on vVO2max.

S03.6
Predictive potential of peak speed and the critical time for recovery
Christian Heyde, H Mahler, A Gollhofer
Albert-Ludwigs University Freiburg, Department of Sport and Sport Science, Freiburg, Germany

Peak speed (SPEAK) and the repeated sprint ability (RSA) are known to be crucial predictors of the physical demand within soccer matches. In respect of indices that quantify RSA, only moderate correlations to corresponding indices of match performance are documented. Therefore, in addition to SPEAK a critical regeneration time (tcrit) derived from a modified RSA-Test were evaluated in this study. 12 youth male soccer players (178 ± 6.7 cm, 72.8 ± 8.3 cm, 17.1 ± 0.3 y) performed a modified RSA-Test and a 2x35min soccer match. The RSA-Test comprised 13 maximal 2x20 m sprints divided by a 180° turn. The recovery time between sprints decreased from 130 sec to 20 seconds. SPEAK was derived from the 2nd 20 m section of each sprint. tcrit was determined at the critical time where a significant decrease in sprint performance was evident. Individual match performance was tracked with a GPS-Accelerometer system. Correlations between peak speeds (SPEAK) of the RSA-Test and the match as well as tcrit and the time (T30%PEAK) that was spent above a fixed speed threshold (30% peak speed from the RSA-Test) were observed. SPEAK of the RSA-Test and SPEAK of the match were significantly correlated (0.94, P < .01). Similarly, a high correlation was found between tcrit and T30%PEAK (0.92, P < .01). tcrit may indicate a new useful marker to quantify an individual’s ability to sustain at higher running speeds during the match. In addition, the comprehensibility of SPEAK and tcrit might strengthen practical applications for non-physicians in soccer.

S03.7
Strength and power variation across preseason in school rugby players
Barry Horgan(1), DK Collins(2)
(1) Barry Horgan Strength and Conditioning (BH S&C), Dublin, Ireland
(2) ITT, Department of Sport Science & Health, Dublin, Ireland

The objective of the current study was to investigate the extent to which strength and power levels may relate to playing status (starter vs. non-starter) in the first competitive game of the school rugby season.

Thirty-eight schools rugby players with mean (±SD) age, body mass and height of 17.0years (±1.0), 84.69kg (±15.02) and 181.89cm (±5.49). The participated in the study. Strength testing was conducted at the end of the pre-season and consisted of (predicted) one repetition maximum (1RM) barbell back squat to box, power clean, barbell bench press and chin-ups. Pull-ups were tested for the maximum number of repetitions performed using body-weight and mean power (Watts) was assessed for barbell jump squat. A one way ANOVA with significant differences accepted at a criterion alpha level of p<0.05 was used to compare the groups.

Results indicated that there was a significant difference (p<0.05) in the barbell jump squat test
between starters (3076 ± 135.8 W) and non-starters (2744 ± 410.9 W). Power qualities can differentiate between starters and non-starters in the current group. The findings demonstrate the importance of power production in school rugby players. The information provides benchmarks for power development in schools rugby players. Further research is warranted to establish the relative importance of other areas of fitness in school rugby players and how they relate to positional groupings and competitive playing status.

15:45 - 17:15
S04 SPORT SOCIOLOGY

S04.1
Gaelic football and the tension balance between amateurism and professionalism

John Connolly(1), P Dolan(2)

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(2) Dublin Institute of Technology, Dublin, Ireland

Gaelic football is one of the few remaining amateur sports. However, pressures at the elite level have led to what some argue is its increasing professionalisation. These contemporary debates on professionalism have tended to mask oscillations in the organisation of the sport along what can be described as the amateur–professional continuum over the course of the last 130 years. Viewed over the longer term through the theoretical lens of figurational sociology, this paper explains how and why the ethos of both amateurism and professionalism were amplified and de-amplified at different times by various groups comprising the GAA. The paper explains how the sport came to be initially organised under amateur rules and the ambivalence surrounding this. In turn, the paper outlines the structure of interdependencies, and the tensions generated by these, in explaining how both professionalism and amateurism were amplified and de-amplified over the course of the twentieth century. Significantly, the paper explains why the professionalisation of the sport gradually, and in a non-linear fashion, advanced and intensified over the decades, and why professionalism became ‘de-stigmatised’ to an extent. Interestingly, this occurred alongside the increasing amplification of the discourse of amateurism. Data was derived from numerous sources covering the period 1870 – 2000, including: minutes of official GAA meetings; official documents and manuals including the rules and constitution of the GAA; newspapers articles; magazines dedicated to the sport; and wider sociological and historical studies of Ireland.

S04.2
American football and national identity

Gerald Gems

North Central College, Health and Physical Education, Naperville, IL, USA

This study invokes an interdisciplinary approach to deconstruct the American national game of football. The methodology incorporates history, sociology, anthropology and linguistic analysis to elicit greater understanding of American culture. The evolution of the game throughout the latter nineteenth century transformed it from soccer to rugby to the current version of violent, surrogate
warfare between regional scholastic rivals and urban professional teams. By the 1890s the game had become a national spectacle among socially elite collegiate teams for the attainment of cultural capital. Despite the deadly carnage politicians hailed the game as an antidote to the increasing feminization and a means to promote the courage and leadership necessary to compete with Europeans for global supremacy. The burgeoning professional circuits incorporated working class players that promoted the perception of democracy and meritocracy across disparate social groups as the game spread beyond the college campuses. The martial qualities and territorial gain encompassed by the game reinforced military operations throughout the twentieth century. American military and political leadership became increasingly gleaned from the ranks of football players, who settled differences with force rather than negotiation. Children became socialized to not only accept such violence but revel in it at an early age. Football players became heroes, extolled in the media and publicly displayed in annual spectacles. The Super Bowl championship of the professional NFL serves as a two week long national festival exalting militarism. American football thus offers a greater understanding of the United States and its sometimes bewildering culture and politics.

S04.3
Sport teams as social entities: tensions and potentials

Lars Tore Ronglan
Norwegian School of Sport Sciences, Oslo, Norway

The aim of this presentation is threefold. First, the attention is directed towards ontological and epistemological questions related to sport teams. What is the nature of a sport team, and how can such a social phenomenon be perceived? In contrast to the usual perception of a team as a unit consisting of individuals, an alternative approach is launched, namely the team viewed as webs of diverse social relations and situations. It is argued that such an approach may make it easier to grasp the complexities of teams, where ambiguity, pluralism, and tensions are recognized as immanent features to be handled rather than problems to be solved. Second, some consequences for research on sport teams are discussed. A complexity approach implies a deconstruction: a shift from understanding the team as one, unambiguous group (a fixed totality) to focusing on tracing social processes within and across diverse team contexts. The approach may direct the attention towards (a) contextual characteristics (on/off court), (b) inherent tensions (collaboration/competition), and (c) recurring social situations (logics at play). Third, implications for participants are suggested: how to become a ‘team player’ from this point of departure? To participants a main challenge becomes to contribute to and manage the complexity and tensions in adequate ways. This includes embracing heterogeneity, displaying flexibility and social competence, and managing ambiguity.
S05.1 Perceived stress as a predictor of sport injuries in football: A latent class analysis

Urban Johnson, A Ivarsson, A Edvardsson
Halmstad University, Center of Research On Welfare Health and Sport, Halmstad, Sweden

Research shows that psychosocial factors, such as perceived stress could increase injury risk. Using adaptive coping skills are suggested to decrease injury risk. The aim of the study was to investigate stress and coping skills relation to injury risk. Participants were 67 competitive football players with mean age 16.57 (SD = .75). In the beginning of the season 2014 players were asked to complete questionnaires measuring level of stress symptoms (i.e., psychological and physiological) as well as coping skills. The physiotherapist registered injuries during the first 6 months of the season. Latent class analysis was performed to analyze the data. An odds ratio was calculated to compare the odds of belonging to a specific class based on injury rates. The model with best fit contained two different latent classes. Members of the first class (n=55) reported low level of psychological stress symptom (M=1.78) and moderate level of physiological stress symptom (M=3.59). Moreover, they indicated moderate level of adaptive coping skills (M=1.77). In comparison, members of the second class (n=12) reported higher levels of psychological (M=2.85) and physiological (M=4.84) stress symptoms and slightly higher on coping skills (M=1.84). The result showed an lower injury risk for the players belonging to the first class in comparison to the participants in the second class (OR=0.83). The result indicates that high levels of stress symptoms might increase the risks of injury among football players. Football players are encouraged to participate in stress management interventions to prevent sport injuries.

S05.2 Psychologically based programs for injury prevention in football: a meta-analysis

Andreas Ivarsson, U Johnson, A Edvardsson
Halmstad University, Center of Research on Welfare, Health and Sport, Halmstad, Sweden

Several studies have found that stress increases the risk for sport injuries. It is therefore suggested that psychologically based intervention programs, targeting perceived stress, could decrease injury risk. The objective of the study, using a meta-analysis procedure, was to evaluate the effect of psychologically based interventions, performed in football populations and based on documented injury rates. A literature search founded on the electronic databases; PsycINFO, Web of Science, Web of Knowledge, PubMed, Science Direct and Google Scholar were examined using combinations of key words, such as ‘sports injury’, ‘psychology’, ‘intervention’ ‘prevention’ ‘soccer’ and ‘football’. The literature review resulted in three studies that together contained 100 participants. The interventions were based on different approaches such as mindfulness, and mental skills training. All studies, included in the analysis, reported fewer injuries for the experimental groups in comparison to the control groups (Cohen’s d effect sizes 0.89, 0.59, and 1.27). The overall results correspond to a Cohen’s d effect size of 0.86, p <.001, (95 % CI 0.44-1.28). The
result indicated that psychologically based intervention programs have potential to decrease the risk of sport injuries in football populations. These results are in line with intervention studies performed within others sports (e.g. floorball). One reason for the effectiveness of the intervention could be that all three were offering stress management education. Because sport injuries have a negative impact on athletes, teams and communities, athletes are recommended to work with psychological training programs as a part of their injury prevention work.

**S05.3**

**Reflections from a sport psychology practitioner on a Swedish psychological injury prevention intervention with young elite football players**

*Arne Edvardsson, A Ivarsson, U Johnson*

*Halmstad University, Center of Research On Welfare Health and Sport, Gothenburg, Sweden*

It has been suggested that psychological skills training interventions, organized in an experimental design, can reduce injury risk in football populations (Edvardsson et al, 2012). In the preparation phase of an intervention study it is valuable to analyze reflections and comments from participants and sport psychology practitioners involved in earlier interventions. The aim of the study was to summarizing these considerations in a structured applicable frame work. In the study young Swedish football players (16–19 years old), organized in an experimental group (n = 13), took part in seven individual meetings. Focus of the intervention was education in somatic relaxation, thought stopping, emotions/ problem focused coping, goal setting, biofeedback training and also how to use a critical incident diary. After the completion of the intervention program participants were asked to answer a questionnaire concerning the content of the intervention. Positive support for the overall procedure was expressed and recommendations for future interventions were suggested. Both strong points (e.g. use of biofeedback) and suggestions for future development (e.g. location of consultation sessions) were communicated. A variety in preference was found in regards to what was perceived as most valuable lessons learned such as “learning how to tackle stressful situations”. The sport psychology practitioner providing the intervention reflects on important consultation situations documented with systematic DART (Description, assessment, response, treatment) notes. Edvardsson, E., Ivarsson A., & Johnson U. (2012). Is a cognitive-behavioural biofeedback intervention useful to reduce injury risk in junior football players? Journal of Sports Science and Medicine, 11, 331-338.
S05.4
‘Perfectly normal’ – a descriptive phenomenological study of the lived experience of injuries acquired during recreational football training in men with prostate cancer undergoing androgen deprivation therapy (The FC Prostate Trial)
Julie Midtgaard(1), DM Bruun(1), J Uth(1), T Hornstrup(2), P Krustrup(2)
(1) Copenhagen University Hospital Rigshospitalet, The University Hospitals Centre for Health Research (UCSF), Copenhagen, Denmark
(2) University of Copenhagen, Department of Nutrition, Exercise and Sports, Copenhagen, Denmark

Background: Evidence supporting the health promoting effects of recreational football in patients with chronic conditions is accumulating. Moreover, recent research shows that it is possible, through football, to promote health in populations otherwise hard-to-reach, e.g. male cancer survivors. However, a recent study including prostate cancer patients undergoing androgen deprivation therapy (The FC Prostate Trial), documented a considerable number of adverse events including bone fractures.

Purpose: The objective of this study was to describe prostate cancer patients’ lived experience of injuries acquired during football training.

Material and Methods: A descriptive phenomenological study was conducted based on audio-taped, semi-structured interviews with four men, who had been injured during football training. Transcripts from the audio-taped interviews were used for qualitative text condensation analysis, inspired by Giorgi’s phenomenological methodology.

Results: The analysis revealed three themes (“calculated risk”, “boys don’t cry”, and “nothing compared to the cancer”) summarized into one overall concept, “perfectly normal” describing the essence of prostate cancer survivors experiences.

Conclusion: Men with prostate cancer undergoing ADT view injuries acquired through football training as a psychologically harmless, acceptable and meaningful consequence of participating in sport, potentially supporting their feeling of masculinity including a desire to feel and behave like normal healthy individuals. Perspective: Although injuries may be prevented, severe injuries related to football training in untrained is not completely avoidable. However, this risk may be outweighed by not only by already documented positive physiological effects but equally by the men’s acceptability and perceived psychological benefit of participation in high-risk sporting activities.
THURSDAY, 21 MAY 2015

09:00 - 10:00
W01 WORKSHOP

W01
Fitness training and testing of the top player
Barry Drust
Liverpool John Moores University, Research Institute for Sport and Exercise Sciences, Liverpool, UK

Soccer is a complex sport from a physiological perspective as it requires competence in a number of different aspects of fitness. The exercise pattern observed in matches is also intermittent and unpredictable. These demands make the development of training and testing programmes for players difficult. This presentation will attempt to provide a theoretical and practical overview of the key considerations in fitness training and testing elite players. Specific topics will include planning and periodization in soccer training, monitoring training load, approaches to the assessment of performance and an analysis of the delivering training and testing programmes in the “real world”.

09:00 - 10:00
W02 WORKSHOP

W02
Prevention of contact and non-contact injuries in football
Mario Bizzini(1), A Junge(1), J Dvorak(2)
(1) FIFA Medical Assessment and Research Centre (F-MARC), Schulthess Klinik, Zurich, Switzerland
(2) Fédération Internationale de Football Association (FIFA), Zurich, Switzerland

Football (soccer) is the most popular sport in the world, played by approximately 300 million individuals at any level. Contact injuries Knowing that an important amount of football injuries are caused by foul play (up to 80% in World Cup Tournaments), the observance of the laws of the game (and Fair Play) is an essential aspect in the prevention of injury. The implementation of rule changes (use of red card) with its strict application by the referees, has shown to clearly reduce the incidence of head injuries in the last 3 FIFA World Cups (Dvorak 2013) and in the Norwegian professional league (Bjorneboe 2013). Non-contact injuries Historically, multi-modal interventions showed a reduction of non-contact injuries in general (Junge 2004). The effectiveness of specific exercise-based prevention programs (standard warm up) has been examined: the PEP program in the field of non-contact ACL injury (Gilchrist 2008, up to 80%), and „The 11+“ (FIFA 11+) basic program (Soligard 2008) were able to significantly reduce (30-50%) the injury incidence in female youth players (findings also confirmed as an example by Walden 2012). Recent RCTs have shown
similar results in term of injury reduction in US male soccer teams (Silvers 2014) and Nigerian male youth teams (Owoeye 2014) adopting the FIFA 11+. Together with the national health insurances and the football associations, a simple prevention program (The 11, implemented in country-wide campaigns in Switzerland and New Zealand) showed an overall reduction (12-25%) of injuries and less health-care related costs in amateur football (Junge 2011).

09:00 - 10:00
W03 WORKSHOP

W03
Nutrition and supplementation in football
Ronald Maughan
Loughborough University, School of Sport, Exercise and Health Sciences, Department of Sport and Exercise Nutrition, Loughborough, UK

The focus of sports nutrition is shifting from competition to providing nutrition support for training to allow consistent, intensive training and to promote adaptations taking place in tissues. Energy intake should vary across the year depending on training load and the need to develop an appropriate physique. An adequate intake of carbohydrate and maintenance of hydration status are also important, but not all players will need a high carbohydrate intake at all times. Post-exercise carbohydrate intake promotes glycogen resynthesis, which is important especially during pre-season training. Protein ingestion (20-30 g of high quality protein) before, during or soon after exercise stimulates net protein balance and may enhance adaptations taking place within muscle. What players eat and drink in the days and hours before a game and during the match itself will also affect performance. Some carbohydrate intake in the last few hours before the game may benefit players if recovery from the last game is incomplete. Dehydration, if sufficiently severe, can impair performance, though this will depend on individual circumstances and on the weather conditions. Individualised hydration strategies should take account of the environment and the individual. A varied diet eaten in adequate amounts should meet the requirement for all micronutrients, but not all athletes eat a varied diet and some restrict energy intake. Supplement use is widespread, but few supplements benefit players. Some carry significant risks to performance and health and all should be used with caution. The need for input from qualified sports nutrition professionals is increasingly recognised.
09:00 - 10:00
S06 HEALTH - PART I

S06.1 Case study: nutrition intervention for an international-standard female football player
Scott Robinson(1), JP Morton(2), GL Close(2), D Flower(3), L Bannock(1)
(1) Guru Performance LTD, London, UK
(2) Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Liverpool, UK
(3) Everton Football Club, Liverpool, UK

Participation in women’s football is rapidly increasing, with more elite players employed on a professional or semi-professional basis than ever before. Nutritional methods to improve performance in the women’s game are sparse, with much of this information extrapolated from the male game. This case study reports an educational and pragmatic nutrition intervention to improve behaviour, body composition and performance for a semi-professional international standard female football player. Over a 12-week period, the athlete was provided with a variety of take-home handouts that prompted her to make appropriate food choices: (a) at times relevant to performance (e.g., training/competition); and (b) throughout her daily living. Improvements in subjective ratings of fatigue and recovery, psychological mood state and gastrointestinal distress were reported. Body mass loss was 1.10 kg. Fat mass loss was 1.55 kg and lean-tissue mass increased by 0.45 kg. This intervention shows that a structured and pragmatic nutrition strategy can be effectively implemented to improve parameters relevant to football performance.

S06.2 Influence of the type of surface on female children football players’ bone mass
E Ubago-Guisado(1), J Sánchez- Sánchez(1,2), J López-Fernández(1), Enrique Colino-Acevedo(1), L Gallardo(1)
(1) Grupo IGID-University of Castilla-La Mancha, Spain
(2) UCAM-Saint Anthony Catholic University of Murcia, Spain

Background: The aim of this study is to determine the influence of different types of playing surfaces on bone mineral content and bone mineral density in girls soccer players.
Methods: Forty girls subjects were recruited for the study from Madrid and Toledo (Spain), and they were from 9 to 13 years old (10.6 ± 1.5 years old Tanner I-III). Total and regional body composition (bone mass, fat mass and lean mass) were measured using a dual-energy x-ray absorptiometry (DXA). Pubertal status was determined using Tanner test and physical activity habits were recorded through a questionnaire ad-hoc. The mechanical properties (force reduction, vertical deformation and energy return) of the playing surfaces were measured with a Triple A (Advanced Artificial Athlete). The analysis of covariance, with height and body mass as covariates, and the analysis of variance were used to assess the differences in bone mass and playing surfaces, respectively. Also, linear regression analysis was performed to find the relationship between the mechanical properties of the playing surfaces and bone variables.
Results: In pubertal group, the soccer players on the ground have improved BMC and BMD values in hip (p <0.05) than the soccer players on the artificial turf.

Conclusions: The playing surface has an important role during puberty in the acquisition of bone mass. A hard game surface, ie, less vertical deformation and greater shock absorption and energy return, promotes higher levels of BMD and BMC in growing girls, regardless of the sport they are playing.

S06.3
Walking football – experiences and outcomes for older players
Peter Reddy(1), I Dias(1), I Nagar(1), C Holland(1), P Krustrup(2), L Connolly(3), H Hubball(4)
(1) Aston University, Birmingham, UK
(2) University of Copenhagen, Copenhagen, Denmark
(3) University of Exeter, Exeter, UK
(4) University of British Columbia, Vancouver, Canada

The health benefits of playing football and the importance of exercise and social contact for healthy ageing are well established but few older adults take enough exercise in the UK. Football is flexible and draws players into engrossing, effortful and social exercise but the physical demands of play at full speed may make it unsustainable for older adults. Restricted to walking pace, will play still be engaging, will the health benefits be retained and the physical demands remain manageable? This pilot study aims to investigate:
1) If older adults can sustain playing walking football every week,
2) if walking football is enjoyable enough to want to play every week,
3) the intensity and locomotor pattern of walking football,
4) the scale and nature of walking football health benefits,
5) the potential of walking football as a sport for older adults.

Randomly allocated ‘walking football’ and ‘waiting list’ groups will be compared before and after 12 weeks of football. The ‘waiting list’ group then play football for 12 weeks enabling both within and between participant comparisons. Measures include:
1) postural balance,
2) blood pressure and resting heart rate,
3) weight, BMI and body composition,
4) cholesterol, blood sugar and markers for bone formation,
5) processing speed and peripheral visual attention,
6) GPS related performance indicators,
7) quantitative and qualitative data on the experience of playing.

Data from the first 12 weeks will be available to present at WCSF 2015.
S06.4
Effects of small-volume football and vibration training on body composition, aerobic fitness and muscular PCR kinetics for inactive women

Luke Connolly(1), S Scott(1), M Mohr(1,2,3), G Ermidis(1,4), R Julian(1,5), J Bangsbo(6), S Jackman(1), K Knapp(1), P Krusstrup(1,6), J Fulford(7)
(1) University of Exeter, Exeter, UK
(2) University of the Faroe Islands, Torshavn, Faroe Islands
(3) University of Gothenburg, Gothenburg, Sweden
(4) Democritus University of Thrace, Komotini, Greece
(5) University of Saarland, Saarbrucken, Germany
(6) University of Copenhagen, Copenhagen, Denmark
(7) University of Exeter Medical School, Exeter, UK

Purpose: The present study investigated the effects of 16 weeks of small-volume, small-sided football training (football group (FG), n = 13) and oscillating whole-body vibration training (vibration group (VG), n = 17) on body composition, aerobic fitness, and muscle PCR kinetics in healthy inactive premenopausal women in comparison with an inactive control group (CO, n = 14).

Methods: Training for FG and VG consisted of twice-weekly 15-min sessions with average heart rates (HRs) of ~155 and 90 bpm respectively. Pre- and post-measurements of body composition (DXA), phosphocreatine (PCr) on- and off-kinetics, and HR measurements during standardised submaximal exercise were performed.

Results: After 16 weeks of training in FG, fat percentage was lowered (p = 0.03) by 1.7% ± 2.4% from 37.5% ± 6.9% to 35.8% ± 6.2% and the PCr decrease in the quadriceps during knee-extension ramp exercise was attenuated (4% ± 8%, p = 0.04), with no changes in VG or CO (time-group effect: p = 0.03 and p = 0.03). Submaximal exercise HR was also reduced in FG after 16 weeks of training (6% ± 5% of HRmax, p = 0.01).

Conclusion: Short duration football training for 16 weeks appears to be sufficient to induce favourable changes in body composition and indicators of aerobic fitness and muscle oxidative capacity in untrained premenopausal women.

09:00 - 10:00
S07 HEALTH - FROM A SOCIAL SCIENCE PERSPECTIVE

S07.1
The influence of club football on children’s daily physical activity

Glen Nielsen(1), A Bugge(2), LB Andersen(2)
(1) Center for Team Sports and Health, Department of Nutrition, Exercise and Sports Sciences, University of Copenhagen, Denmark
(2) Center for Research In Childhood Health, University of Southern Denmark, Denmark

This study investigates the association between playing football as a club-sport and the total amount of daily physical activity among children as well as the mediating effect of increased school recess activity. The study measured the average daily amount of physical activity as well as activity levels
in more specific contexts, such as during club-sports and school recess for a sample of 518 Danish children aged 9 to 10. The study found that children playing club-football as a leisure-time club-sport had higher total daily amounts of physical activity (PA) than both children taking part in other club-sports and children not taking part in club-sports at all. About half of this difference in total PA could be explained by higher activity levels during school recess. The association between club-football and total PA, and the mediating effect of school recess PA, can be interpreted as the result of both the high activity levels during club football and that Danish school-grounds have football facilities which allow able and interested children to play football for many hours each week during school recess. On a more general level the results indicate that the influence leisure-time club sport participation has on PA may depend on the different physical activity levels of different sports but on how well the sport can be transferred to and played in other daily settings for children’s self-organised PA such as school playgrounds.

S07.2
Football fitness: 'Healthy, funny and social'? The perspectives of female and male players
Laila Ottesen, K Swenningsen, LF Thing
NEXS, University of Copenhagen, Department of Human and Social Sciences, Copenhagen, Denmark

This paper is based on a qualitative study with participants of a new Football concept from the Danish Football Association called “Football Fitness” (FF). The FF initiative is organized in small teams in the voluntarily football clubs in Denmark. The aim of this paper is briefly to describe the Football Fitness concept and analyze it from the perspectives of the female and male players attending the concept in the local clubs.

An underlying question of this paper is whether the voluntary football clubs can be health innovators and whether they can attract new members to football training as health promotion. To partly answer this grand question, we have in this paper chosen to present a case: the Football Fitness concept, which in recent years has been introduced in a number of voluntary football clubs all over Denmark. More specific we want in this paper to answer the questions: Are the players participating in Football Fitness for the sake of their health? What qualities do they find in Football Fitness and why do they choose Football Fitness?

The empirical material is based on focus group interviews with the players in a selection of 13 voluntarily football clubs, following approximately 70-80 people aged 24-56.

The participation in Football Fitness will be examined with a focus on both similarities and differences between the male and the female players (teams), regarding their experience and the particular dimensions of Football Fitness – health, fun and sociability - that they find enabling or constraining in order to make them continue being active Football Fitness players.
S07.3
“It was all about the boys” - The inclusion of girls in Gaelic football in Irish primary schools
Richard Bowles(1), M O'Sullivan(2)
(1) Mary Immaculate College, Department of Arts Education and Physical Education, Limerick, Ireland
(2) University of Limerick, Ireland

Gaelic football is the most popular team game in Irish primary schools. Girls’ participation in structured Gaelic football activities, however, is a relatively recent phenomenon. Using a conceptual framework based on the tenets of figurational sociology, this study sought to develop a deeper understanding of the processes that have contributed to girls’ inclusion in these school football activities. Data generation involved the analysis of policy documents developed by sports governing bodies and government agencies. In addition, semi-structured interviews were conducted with administrators, teachers and coaches. The initial coding of the data was carried out inductively. The subsequent development of categories and themes was guided by the research objective and was subject to constant comparison. The involvement of girls in Gaelic football has increased consistently since the early 1970s. The implementation of specific NGB policies has contributed to this increase but, more significantly, general educational policies and broader societal processes have facilitated girls’ inclusion in ways that were frequently unplanned and unintended. Nevertheless, funding inequities and the prioritization of boy’s football serve to impede progress towards more fully inclusive school experiences. Although more equitable and affirmative practices are now evident, some barriers remain to girls’ full participation during curricular and extra-curricular Gaelic football activities. Furthermore, these barriers may also hinder involvement in community sport. Greater co-operation between school and sport organizations may help to overcome these barriers. Specifically, the implementation of inclusive pedagogies by teachers and school coaches, coupled with stronger school-club links, may encourage more girls to play for longer.
S08 AUSTRALIAN FOOTBALL

S08.1 Recent research findings in Australian football: application to other codes?
Brian Dawson
University of Western Australia, School of Human Movement and Exercise Science, Department of Exercise Physiology and Biochemistry, Crawley, WA, Australia

In the past several years, published research into team sports has increased greatly. Australian football is no exception to this trend, as many research groups within the country have published (collectively) well over 100 papers in the past 3 years on various aspects of the game. Broadly, these can be grouped under 4 main themes: a) Altitude training (incorporating both actual altitude camps and "top up" repeat sprint training programmes in hypoxic environments) b) Recovery from training/games (incorporating methods such as cold water immersion, plus effects on next training/game performance) c) Player movement profiles in games (incorporating GPS and accelerometer derived data and match statistics/coach ratings of performance) d) Injury risk/prediction/management (incorporating multi season training and game loads, maturity and injury history analyses) This talk will aim to present the important findings from Australian football research into these topics, and attempt to apply these results (where applicable) to the other major football codes.

S08.2 The effects of physical exertion on decision-making performance of Australian football umpires
Kasey Paradis, D O'Connor, P Larkin
University of Sydney, Faculty of Education and Social Work, Sydney, NSW, Australia

Decision-making is a key component of an official’s in-game performance, with each decision potentially having a direct impact on the result of the game. Additionally, officials have to be physically fit to ensure they keep up with the game-play. While research has identified the decision-making demands and running demands of officials separately, few have explored the relationship between them. The aim of this investigation was to examine the relationship between physical exertion and decision-making performance of Australian Football umpires at the sub-elite and junior levels. A total of 18 Australian Football umpires (Sub-elite, n = 10; Junior n = 8) performed 10 x 300 metre runs, with each repetition immediately followed by a video-based decision-making test and additional 1 minute of recovery. A Mann-Whitney U assessment indicated a significant difference between the sub-elite and junior level umpires for decision-making accuracy (U = 13.00, z = -2.43, p = 0.016, r = -0.5). However, there was no significant difference in response time (U = 28.00, z = -1.07, p = 0.315, r = -0.25). The sub-elite umpires completed the running efforts in significantly less time than the junior umpires (p>0.05). Further, there was no significant correlation between decision-making performance and running times for either skill level (p>0.05). This suggests decision-making performance may not be affected by physical exertion. Therefore, it may
be suggested coaches of football officials allocate more time to the decision-making development of their officials instead of focusing largely on the physical fitness side, as is currently the trend.

**S08.3**

**Match success in elite Australian football: a 14-year analysis**

*Brendan H Lazarus(1), AM Stewart(1), WG Hopkins(1,2), RJ Aughey(1)*

(1) Institute of Sport, Exercise, and Active living (ISEAL), Victoria University, Melbourne, Australia

(2) Defence Institute, Oslo, Norway

**Purpose:** Aspects of the fixture list and team characteristics are likely to affect match outcome in team sports, but evidence for such effects in Australian football is mainly anecdotal. The aim of this study was to quantify these effects at the elite level in this sport.

**Methods:** Match statistics of 5112 Australian football matches from seasons 2000 to 2013 were accessed at AFLtables.com. Aspects of each match included location (home vs away), travel status (travel vs no travel), days break between matches (≤ 7d vs ≥ 8d), and differences between the opposing teams in their mean age, weight and height. A logistic-regression version of the generalised mixed linear model was used to estimate the effect of each aspect on match outcome. Effects were expressed as extra matches won or lost in every 10 matches against an otherwise evenly matched team.

**Results:** for every 10 matches played, the effects were: playing away, 1.5 losses; travelling, 0.7 losses; days break, 0.1 wins; being older, 2.8 wins; being heavier, 1.7 wins; and being taller, 0.3 losses. Adjustment for age difference did not substantially reduce the effect of weight. All these effects were clear, mostly at the 99% level. **Conclusions:** The effects of playing away, travel and age difference were not unexpected, but the trivial effect of days break and the advantage of a heavier team will challenge current notions about balance of training and recovery and about team selection.

**S08.4**

**Seasonal training periodization of an elite team in the Australian Football League**

*D Ritchie(1,2), WG Hopkins(1), Jonathan D Bartlett(1,2)*

(1) Institute for Sport, Exercise & Active Living (ISEAL), Victoria University, Footscray, Victoria, Australia

(2) Western Bulldogs Football Club, Footscray, Victoria, Australia

**Introduction:** The advent of intensive monitoring of team-sport athletes now allows coaches and sport scientists to address important practical questions about training and game volumes and intensities. The aim of the current study was to conduct an analysis of the training periodization practises employed by an elite team in the Australian Football League (AFL) during the 2014 season.

**Methods:** Perceived load (exertion × duration) for the 44 players was obtained after each training session and match via individual interviews, while total distance of pitch-based training sessions and matches was monitored via GPS units. Weekly totals were quantified in six blocks of training
(2× pre-season, 1× taper, 3× in-season) with general linear mixed models that adjusted for effects of 41 injuries (duration 29 ± 24 d, mean ± SD). Effects were assessed with inferences about magnitudes standardized with between-player SD.

Results: Total load was moderately greater in pre-season than in in-season blocks, but differences for total distance were only trivial or small. Half the in-season total load came from training, predominantly skills and upper-body weights. Injury caused moderate-large reductions in total distance in the weeks before return to matches, but the only effect on total load was a moderate reduction >2 week before return. All effects of injury after return to matches were trivial.

Conclusion: GPS distance and perceived load provided data on complementary aspects of periodization that should help elite AFL teams assess the impact of its injuries and refine its strategies for training.

S08.5
Effect of instructions prioritizing speed and/or accuracy on kinematics and kicking performance in experienced football players
Roland van den Tillaar, P Fuglstad
University College of Nord Trøndelag, Department of Teacher Education and Sports, Levanger, Norway

Velocity and accuracy are two important parameters of ball kicking performance for scoring goals in soccer. These may be incompatible and require different strategies in the execution. Therefore the purpose of this study was to investigate the effects of instruction (emphasizing on velocity, accuracy or both) on performance and kinematics of soccer ball kicking. Results on fourteen experienced male soccer players (mean age 25 ± 5.8 yr.) showed that the type of instruction affected the maximal ball velocity and accuracy. When accuracy was the only priority, the ball velocity was significantly lower and the accuracy was better than when velocity of kicking or both was prioritized. Furthermore, the hit percentage and ball velocity was significantly better when the subjects aimed to kick to the left corner of the goal compared to the right corner. The difference in ball velocity was a result of significantly slower maximal linear velocity of all the involved segments when the main priority was accuracy compared with the other priorities. The lower ball velocity to the right corner was mainly caused by a lower knee extension. In addition, players did not seem to change their kicking technique, i.e. the relative timing of movement initiation of the different body segments and movements. It was concluded that soccer players follow the traditional speed-accuracy trade off, also called Fitts’ law, which stated that velocity decreases when accuracy is more important and that accuracy decreases when velocity is prioritized.
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10:15 - 11:45
S09 MATCH ANALYSIS - PART II

S09.1 Evolutionary match performance patterns in elite football
Paul S Bradley
Leeds Beckett University, Carnegie Faculty, Department of Sport & Exercise Biomechanics, Leeds, UK

This study investigated the evolution of physical and technical performances in the English Premier League (EPL). Match performance observations (n=14700) were collected using a multiple-camera computerised tracking system across seven consecutive EPL seasons (2006-07 to 2012-13). Final league rankings were classified into Tiers: (A) 1st-4th ranking (n=2519), (B) 5th-8th ranking (n=2965), (C) 9th-14th ranking (n=4448) and (D) 15th-20th ranking (n=4768). Teams in Tier B demonstrated moderate increases in high-intensity running distance while in ball possession from the 2006-07 to 2012-13 season (p<0.001; Effect Size [ES]: 0.68), with Tiers A, C and D producing less pronounced increases across the same period (p<0.005; ES: 0.26, 0.41, 0.33). Large increases in sprint distance were observed from the 2006-07 to 2012-13 season for Tier B (p<0.001; ES: 1.21) while only moderate increases were evident for Tiers A, C and D (p<0.001; ES: 0.75, 0.97, 0.84). Tier B demonstrated large increases in the number of passes performed and received in 2012-13 compared to 2006-07 (p<0.001; ES: 1.32-1.53) with small-to-moderate increases in Tier A (p<0.001; ES: 0.30-0.38), Tier C (p<0.001; ES: 0.46-0.54) and Tier D (p<0.001; ES: 0.69-0.87). The number of short and medium passes completed by Tier B followed a similar pattern to total passes with moderate-to-large increases (p<0.001; ES: 1.04-1.29), the proportion of long passes decreased moderately between 2006-07 and 2012-13 (p<0.001; ES: -0.65). Less pronounced changes were evident for Tiers A, C and D for the number of small passes (p<0.001; ES: 0.49, 0.35 and 0.64), medium passes (p<0.05; ES: 0.21, 0.48, 0.69) and the proportion of long passes from 2006-07 to 2012-13 (p<0.05; ES: -0.33, -0.20, -0.48). The point's difference between Tiers A and B in the 2006-07 season was 8 points but this decreased to just a single point in the 2012-13 season. The data demonstrate that physical and technical performances have evolved more in Tier B than any other Tier in the EPL and could indicate a narrowing of the performance gap between the top two Tiers.

S09.2 Game style in soccer: what is it and how can we measure it?
Adam Hewitt, K Norton
University of South Australia, Department of Health Sciences, Adelaide, SA, Australia

Game style is a term commonly used by coaches, sports scientists, performance analysts and media to describe patterns of play in team sports. However, there is a paucity of literature relating to the definition of game style, how it can be measured, or what factors influence our understanding of a team’s style of play. Performance analysis research has often sought to identify factors related to probability of scoring or game success. More recently there has been a shift to investigate team
sports as dynamical systems and to understand how players interact in various contextual environments and circumstances. These interactions, particularly successful, dominant or recurrent patterns, are likely to be important in forming a game style or at least play a part in our perceptions of a game style. This presentation proposes an initial framework of variables that can be measured and used to describe game style. The framework is based on specific metrics within five key moments of play:

1. Established Attack,
2. Transition from Attack to Defense,
3. Established Defense,
4. Transition from Defense to Attack, and
5. Set Pieces.

These metrics have practical applications for coaches and practitioners when evaluating efforts to create or compare particular game styles. They might also be useful for spectators and the media when discussing elements of game style. More importantly, however, they will allow performance analysts to categorise and monitor game styles over time, across leagues and age groups, and provide a deeper understanding of dynamic interactions in invasion-based field sports.

S09.3
Team dynamics during transition moments in small-sided soccer games

Wouter GP Frencken(1,2,3), M Wijnbergen(2), S Olthof(2), KAPM Lemmink(1,2)

(1) School of Sports Studies, Hanze University of Applied Sciences Groningen, The Netherlands
(2) Center for Human Movement Sciences, University of Groningen, University Medical Center Groningen, The Netherlands
(3) Football Club Groningen, Groningen, The Netherlands

Introduction: A large proportion of goals in soccer is scored after quick counter attacks. Moreover, according to dynamical systems theory goal-scoring opportunities are hypothesized to occur after perturbations of the rhythmic flow of attacking and defending. An imbalance in coupling between teams around transition moments may explain this phenomenon. The aim of this study was to compare team dynamics before and after transition moments with periods of regular play and to relate these to the outcome of transition moments.

Methods: Fourteen young elite-standard male soccer players (age 18.4 ± 0.4 years) participated in this study. Eight games of five against five (four field players and a goalkeeper) were played on a 40x30m pitch. Positional data (GPS) was collected to calculate tactical team variables, including centroid position, inter-team distance, length and width. Correlations between teams’ variables were calculated.

Results: Twenty-nine 7-second transition moments were included. Only correlations of the longitudinal centroid positions (t = -2.08, p < 0.05) and the lengths of the teams (t = -2.57, p < 0.05) were significantly higher during regular periods of play compared to transition moments. No differences were found between outcomes of transition moments.

Conclusion: Findings indicate reduced coupling between teams in the longitudinal direction (i.e. from goal to goal) during transition moments when compared to periods of regular play in small-
sided games. Although this indicates that team dynamics around transition moments differ from regular play, the outcome of a transition moment appears to depend on other factors.

S09.4
Determinants of physical match performance in youth football players: neuromuscular aspects
Darragh R Connolly(1), C Castagna(2), L Francini(1,2), A Bosio(1), M Induni(1), E Rampinini(1)
(1) Human Performance Laboratory, MAPEI Sport Research Centre, Olgiate Olona, Varese, Italy
(2) Football Training and Biomechanics Laboratory, Italian Football Federation (FIGC) Technical Department, Coverciano, Florence, Italy

The purpose of this study was to investigate the relationships between neuromuscular characteristics and physical match performance in youth football players. Eighty-six youth players (U14 to U17) performed a number of neuromuscular evaluations: vertical jump, single sprints (10-m and 30-m) and repeated-sprint ability (RSA, 5x30-m) test. Peripheral neuromuscular function of the right knee extensors (peak torque, PT) was measured using electrical stimulation during a repeated 180° changes of direction (COD) test, consisting of 4 levels with increasing intensities. Players’ years from peak height velocity (Y-PHV) was also calculated. A 20-Hz GPS system measured match performance variables: total distance, distance covered above 18 km•h⁻¹ (DS18), accelerations and decelerations. Equivalent distance and distance with metabolic power above 23 W•kg⁻¹ (DP23) were also monitored. Physical match performance increased with age (e.g. DS18, from 3.8±2.0 to 7.4±3.8 m•min⁻¹, p<0.001; DP23 from 12.0±1.6 to 16.5±4.2 m•min⁻¹, p<0.01, for U14 and U17 respectively). Only moderate significant relationships were found for DS18 and DP23, with PT measured after the last two levels of the COD test, 30-m sprint, RSA mean time and Y-PHV (0.31<r>0.45, p<0.05). All other relationships were small or not significant. When only individuals reporting an RPE >5 a.u. during a match were considered (n=30) in the analysis, the magnitude of correlations increased (becoming large in some cases). The present study confirms that players maturity and neuromuscular characteristics has an effect on high-intensity match performance. This influence is more pronounced when the players’ physical abilities become more strained during a match.

S09.5
Determinants of physical match performance in youth football players: metabolic aspects
Carlo Castagna(1), L Francini(1,2), A Bosio(2), DR Connolly(2), D Carlonago(2), E Rampinini(2)
(1) Football Training and Biomechanics Laboratory, Italian Football Federation (FIGC) Technical Department, Coverciano, Florence, Italy
(2) Human Performance Laboratory, MAPEI Sport Research Centre, Olgiate Olona, Varese, Italy

The aim of this study was to examine the relationships between endurance field-tests and high-intensity match activities in youth football players of different ages. Sixty-seven youth football players (U14 to U17) were tracked with 20-Hz GPS units during friendly matches and assessed for aerobic fitness with popular field tests (High-intensity Intermittent Test, Yo-Yo IR1, Mognoni’s
test). Players’ years from peak height velocity (Y-PHV) was also calculated. Total distance (TD), distance covered above 18 km•h⁻¹ (DS18), distance covered with accelerations or decelerations greater than 2.0 or 2.5 m•s⁻², equivalent distance (ED) and distance with metabolic power above 23 W•kg⁻¹ (DP23) were considered as representative of high-intensity activity (HI) during a match. Results showed mainly moderate-to-small associations (0.30 < r < 0.50) of aerobic fitness variables with match activities. When match perceived effort was considered (match intensity, RPE >5 a.u. Borg Scale, n=30) the relationships become large for TD, ED, DP23 and decelerations. for accelerations, the relationships become large only with YoYo IR1. A moderate effect of Y-PHV was observed on HI match variables when match RPE >5 a.u. was considered. This study showed that in young non-elite football players aerobic fitness assessed either with maximal (Yo-Yo IR1) or sub-maximal (HIT, Mognoni’s test) field tests was mainly moderately associated with match HI. The influence of metabolic aspects seem to be more pronounced when the players’ physical abilities become more strained during a match. Estimated physical maturity had a moderate effect on match HI in this age span.

10:15 - 11:45
S10 BIOMECHANICS

S10.1 Ball kicking dynamics in football codes: new insight for coaching cues

Hiroyuki Nunome  
Fukuoka University, Faculty of Sports and Health Science, Fukuoka, Japan

Much practical advice exists on how to kick the ball better, how to achieve coordinated kicking motion and how to prevent injuries regarding kicking motion. Our research group has made a series of attempts to clarify ball kicking dynamics over several football codes. These studies have succeeded in demonstrating several unique and unexpected results. The aims of this talk is to introduce these studies to better develop our understanding of ball kicking motion and to shed some light on the veracity of some practical coaching instructions currently used. On the field, coaches often advise players to 'kick through the ball' and some coaches with a physics background might say 'push the ball as long as possible'. On the other hand, in the punt kick used for rugby code and Australian rules, the coaching cue 'kick with a firm foot' is used to encourage players to make the kick foot and ankle as rigid as possible to maximise distance and decrease kick errors. This coaching cue also has a theoretical support, as a firm foot might increase effective striking mass for ball impact. However there has been limited evidence to support these types of instruction from a biomechanical perspective. It has been revealed that some coaching cues seem to be inaccurate, some of them warrant further investigation and some of them like 'kick through the ball' have recently been supported scientifically and likely work to fine tune the kicking technique.
S10.2
The effects of wearing textured insoles and clinical compression socks on kicking performance in association football

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(2) FiDiPro Programm, Faculty of Sport and Health Sciences, University of Jyväskylä, Finland
(3) Center of Sports Engineering Research, Sheffield Hallam University, United Kingdom
(4) Physical Education and Sports Science, Nanyang Technological University, Singapore
(5) Movement Neuroscience Program, Institute of Health and Biomedical Innovation, Queensland University of Technology, Australia
(6) Faculty of Sports Science and Recreation, Universiti Teknologi MARA, Malaysia

The purpose of this study was to observe effects of wearing textured insoles and clinical compression socks on coordination of kicking actions in participants differing in skill level in association football. Twelve male, skilled and less skilled football players (15.42 ± 0.95 years old) performed 20 instep kicks with maximum velocity, in four randomly organised insoles and socks conditions, a) Smooth Socks-Smooth Insole (SSSI); b) Smooth Socks-Textured Insole (SSTI); c) Compression Socks-Smooth Insole (CSSI) and d) Compression Socks-Textured Insole (CSTI).

Reflective markers were placed on key anatomical location and the ball to facilitate three-dimensional (3D) movement recording and analysis. There was a significant Group*Insoles/Socks interaction (p<0.05) for initial ball velocity, foot velocity, ankle range of motion and maximum hip angular velocity. The most powerful instep kicking was achieved in the CSSI conditions (initial ball velocity, 19.75 m s\(^{-1}\) ± 2.97 m s\(^{-1}\)), followed by CSTI (initial ball velocity, 19.4 m s\(^{-1}\) ± 2.99 m s\(^{-1}\)). The main findings suggest that use of textured materials increased movement sensitivity and enhanced movement organisation leading to more powerful kicking actions, compared to use of non-textured/compression materials. Results were interpreted to suggest that adding texture to football boot insoles and use of compression materials might improve performance of sport skills like kicking, since they provide enhanced somatosensory system feedback needed for foot placement and coordination of the lower limbs during kicking performance. Further works needs to investigate whether textured/compression materials can be utilized by athletes to enhance skill performance through improving perception of movement.

S10.3
How panel shape effect to fly on soccer ball

Sungchan Hong, T Asai
University of Tsukuba, Institute of Health and Sports Science, Ibaraki, Japan

Soccer balls such as the Adidas Fevernova that have been used in soccer tournaments thus far had 32 pentagonal and hexagonal panels. Recently, the Adidas Teamgeist and Adidas Jabulani, respectively having 14 and 8 panels, have been used at tournaments; the aerodynamic characteristics of these balls have not yet been verified. Now, the Adidas Conext15, having 6 panels, has been developed for use at the FIFA Women's World Cup 2015; therefore, it is necessary to understand its aerodynamic characteristics. The purpose of this study is to analyze the basic
aerodynamic characteristics of modern soccer balls by using a wind tunnel. Also, we measured the position and orientation of the aerodynamic forces for each ball. Furthermore, we used an impact-type ball ejection device to measure the values of the coordinates of the point at which the ball lands. The results of the points of impact of the soccer balls using the impact-type kick robot demonstrated that the ball trajectory changes dramatically according to the orientation of the panels and panel numbers. Wind tunnel tests indicated that the aerodynamic forces on the balls varied significantly according to the number of panels and the panel orientations.

S10.4
Upper body kinematic analyses of rugby passes from the ground
Mark Sayers, R Ballon
University of The Sunshine Coast, School of Health and Sport Sciences, Maroochydore DC, QLD, Australia

Nearly 50% of the passes in rugby union involve the ball being delivered from the ground. Players are required to show equal skill when passing to either their dominant or non-dominant sides. Surprising, despite the importance of this key skill, scientific literature on the rugby pass from the ground is limited. Accordingly, the aims of the study were first to identify the kinematic determinants of pass velocity, and secondly to examine whether these determinants change when participants passed to their dominant or non-dominant sides. Standard infrared motion capture procedures (250 Hz) were used to assess upper body kinematics in 13 semi-professional rugby union players passing at a target (8 m away). Testing involved six passes from both dominant and non-dominant sides, with pass accuracy recorded using a 5 point scale. Trials to the preferred side recorded significantly higher pass velocities (12.34 ±2.10 m/s) and accuracy scores (4.0 ± 0.5) than those from the non-preferred side (10.95 ±1.71 m/s, P=0.02; 3.2 ± 0.7, P= 0.001). Movement variability analysis (NoRMS) of shoulder and elbow flexion/extension kinematics indicated both greater overall movement variability and greater standard deviation values at ball release for passes to the non-dominant side. Maximum leading shoulder flexion velocities (r=.45 and r=.48) and maximum trailing shoulder adduction velocities were correlated significantly(r=.41 and r=.46) with ball velocity for passes to both sides, whilst other significant correlates differed between sides. Findings suggest that despite displaying a level of passing proficiency, participants presented with a bias when passing towards their dominant side.

S10.5
Ground reaction forces and lower limbs muscular activity during soccer goalkeepers’ side dives
Thibaut Hervéou, A Rahamni, S Boyas, F Chorin, S Durand
(1) University of Le Mans, Department of Sports Sciences, Le Mans, France

The goalkeeper is a key element for the result of a soccer game. Strangely, few studies focused on this player. A specific goalkeeper’s action is the side dive, which is performed to stop opponent shots. Side dives require specific technical and muscular skills. The aim of our study is to investigate the mechanical and neurophysiological processes involved in side dives. Ten
goalkeepers performed side dives in an attempt to repel a soccer ball hanging at a defined height. Six experimental diving conditions were tested combining three ball heights (0.5m from ground, 1.22m and 2.44m) and two side conditions (diving to the left or right). For each leg we monitored 1) ground reaction forces using force plates 2) muscle activity of seven muscles by electromyography. The pushing time lasted 0.75 ± 0.12s. The contralateral leg pushed firstly, both legs pushed simultaneously during 0.21 ± 0.02s and the lateral leg ended the pushing phase. Vertical forces were not different between the two legs. Mean vertical force peak was 18.57 ± 3.46 N.kg⁻¹. Mediolateral forces were greater for 0.5m conditions than 1.22m and 2.44m conditions. Muscular activity was close to maximal voluntary contractions for all muscles investigated (range 75-100%). Electromyography confirmed that knee extensors and ankle plantar flexors were the most activated muscles followed by ankle dorsiflexors and knee flexors. This suggests that during side dives, both legs have significant importance but at different times. Consequently, development of knee extensors and ankle plantar flexors strength is fundamental to improve side dive performances.

10:15 - 11:45
S11 FATIGUE - PART I

S11.1 Monitoring of stress and fatigue in football
Tim Meyer
University of Saarland, Institute of Sports and Preventive Medicine, Saarbrücken, Germany

In professional football, a management of recovery has become more and more common. A prerequisite for the initiation of regenerative measures is the identification of players who are overproportionally stressed or fatigued when an individualized approach is intended. Besides the choice of appropriate stress/fatigue indicators several other methodological issues have to be solved among them the optimal timing of measurements. Also, a certain amount of fatigue is part of the normal training process and might thus be rather necessary than unwanted. Finally, aspects of cost-effectiveness and standardisation of measurements come into play.

S11.2 Sleep, travel and recovery of elite footballers during and following long-haul international air travel
Hugh Fullagar(1), R Duffield(2), S Skorski(1), D White(3), J Bloomfield(4), T Meyer(1)
(1) Saarland University, Germany
(2) University of Technology, Australia
(3) Irish Football Association
(4) Support2Perform, Ireland

Objective: Anecdotally sleep has been reported critical for recovery in professional football, but there is a paucity of descriptive data of situations which have potential to disrupt normal sleeping patterns. The present study examined the sleep, travel and recovery responses of elite footballers
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during and following long-haul international air travel, with a further description following two matches.

Methods: 15 elite male football players travelled from the United Kingdom to South America (-4 h time-zone shift, 18-h travel) for a 10-day tour. Objective sleep parameters (duration, efficiency, onset latency, wake episodes) were collected every day. Perceptual jet-lag (Liverpool John Moores Jetlag Questionnaire) and recovery (Rest-Q-19 for Sport) were collected prior to departure (baseline) and on days 2, 4, 6 and 10.

Results: Sleep was significantly reduced during outbound travel compared to night 1 (night following arrival; P<0.001) and 7 (P=0.01). Additionally, players slept significantly less after both night matches (night 5 and 10, kick-off at 20:00 and 20:40, respectively) compared to all other nights (all P<0.001). Outbound travel, nights 1-4 and 7-9 showed large negative effects (d>0.90) on sleep efficiency. Neither perceptual recovery measures nor perceived jet-lag showed significant differences between baseline and all other days (P>0.05); although jet-lag showed a large effect on day 2 (d=1.47).

Conclusions: Sleep duration is reduced during long-haul international travel and following late-night matches in elite footballers but with limited effects on perceptual recovery. However, whilst the results suggest sleep is poor during long-haul travel, there is a significant increase in sleep indices upon arrival.

S11.3
The impact of elite A-league football match play on countermovement-jump performance, salivary cortisol and salivary testosterone

Amber E Rowell(1,2), SJ Cormack(3), WG Hopkins(1,4), AM Stewart(1), RJ Aughey(1)

(1) Victoria University, Institute of Sport, Exercise and Active Living, Melbourne, Australia
(2) Melbourne Victory Football Club, Melbourne, Australia
(3) Australian Catholic University, Melbourne, Australia

Introduction: Countermovement jumps and salivary hormones provide useful markers of recovery of players in Australian football. The aim of this study was to investigate the potential of these markers for monitoring recovery in association football.

Methods: Eighteen A-league male football players performed a countermovement jump on a force platform and provided saliva samples on seven occasions between 1 d before and 4 d after each of three pre-season matches. Player load in each match was monitored with accelerometry. Match-associated changes in 11 measures of jump performance and in concentrations of salivary cortisol and testosterone were analyzed via log transformation with a mixed linear model that included fixed effects of three levels of player load in each game and random effects to account for individual responses. Sensitivity was assessed with t statistics for the changes.

Results: Jump height was the most sensitive marker and showed the greatest changes immediately after the game (-10.2%, 90% confidence limits ±5.0%) and 18 h later (-7.4%, ±3.3%). All measures of jump performance showed trivial or unclear changes by 2 d after the game. Cortisol and testosterone were elevated only immediately after the game (122%, ±42%; 30%, ±14%). Changes in all markers showed substantial associations with player load.
Conclusions: Height of a countermovement jump appears to be an effective measure for monitoring recovery, but salivary hormones are markers only of acute game load in pre-season games with these athletes.

S11.4
The technical and physical performance responses to 120 minutes of soccer-specific exercise

Liam D Harper, DJ West, E Stevenson, M Russell
Northumbria University, Department of Sport, Exercise and Rehabilitation, Newcastle Upon Tyne, UK

The technical and physical performance responses to 90 minutes of soccer-specific exercise have been extensively reported. However, responses to extra-time (ET; an additional 30 minutes of play) are unclear. Therefore, this study aimed to determine the technical and physical performance responses to 120 minutes of soccer-specific exercise.

Following familiarisation, 22 university standard soccer players completed 120 minutes of simulated soccer match-play during which 30 x 15-m sprints and 30 ball dribbles were performed. Additionally, players performed three counter-movement jumps (CMJ), three 20-m sprints and a shooting skill test at baseline, 45 min, pre-second half, 90 min and 120 min. Technical actions were recorded and analysed for measures of ball precision, speed and success.

Exercise significantly influenced all physical performance variables examined (P<0.05) with 15-m sprint velocities in ET reduced compared to the first (-10.3%) and second half (-6.2%) (P≤0.0005). At 120 min, 20-m sprint velocities were significantly lower than observed at all other time-points, including 90 min (-8.3%) (P<0.01), whereas CMJ height remained similar to baseline (P>0.05). Shot velocities were significantly lower at 120 min compared to all other time points except pre-second half (decrement range -4.2% to -6.2%) (P<0.05). The remaining indices of technical performance remained similar to baseline (P>0.05).

This study is the first to investigate the technical and physical performance responses to 120 min of soccer-specific exercise. Both physical and technical performance was reduced during ET compared to normal time; therefore, the efficacy of interventions that may ameliorate diminutions in performance during ET remain to be investigated.

10:15 - 11:45
S12 GENERAL PSYCHOLOGY - PART I

S12.1
Applying psychology in elite and professional football

Geir Jordet
Norwegian School of Sport Sciences, Department of Coaching and Psychology, Oslo, Norway

There is much scientific evidence that psychological factors in considerable part discriminate those football players who make it to the top professional level, and those who do not. However, despite this knowledge, most professional football clubs still seem to not fully employ psychological performance development programs that are functionally integrated into the day-to-day practice at
the club. In this light, one can always argue that people in football clubs need to be more progressive and embracing of sport psychology. However, a more important reason may be that sport psychology itself has failed to provide relevant, football specific and concrete psychological solutions for coaches and players to effectively use. In this presentation, the presenter will refer to research on psychology in football as well as 20 years of experience in applying psychology to elite football (in more than 10 different countries). With this an attempt is made to demonstrate how sport psychology practitioners effectively can develop a psychology knowledge base, and then structure and market their services, to effectively penetrate into the often conservative, protectionist and closed world of professional football. The basis for the presentation is a comprehensive model (the 11-model) outlining a summary of the research we have about elite football player characteristics. This model also provides a way to anchor psychological processes in football to context-specific and functional performance development processes. The presentation will include empirical evidence, psychological profiling and monitoring tools, case-studies, and practical demonstrations of how sport psychology can be effectively communicated to coaches and players.

S12.2
An exploration into enhancing resilience in Premier League Academy Football players using a positive psychology based educational intervention
Misia Gervis, A Goldman
Brunel University, College of Health and Life Sciences, Uxbridge, UK

The focus of this study was to investigate the efficacy of an educational intervention programme based on positive psychology to enhance the emotional resilience of a group of U16 premier league academy footballers. These players due to their unique environment were considered to be at risk of negative psychological symptomology, which the program sought to address by strengthening their emotional resilience. Research has consistently shown that enhancing emotional resilience inoculates against potential psychological risk. Using the seven factor model of resilience proposed by Reivich & Shatté (2002) and the associated Resilience Quotient Test, pre-testing revealed below average scores for five of the seven factors. The intervention programme was delivered to nine U16 academy players over the course of eight weeks in pre-season. The purpose was to strengthen and enhance their emotional resilience across each of the seven resilience factors, to prepare them for a critical and potentially stressful season. The results from this study found that resilience could be enhanced and developed in adolescent football players. In particular, the factors of emotion regulation, causal analysis and empathy showed significant improvement – with emotion regulation, previously the lowest scoring factor, showing the most improvement. This study indicates not only that the programme itself can work successfully, but also that resilience can be enhanced – which has implications for the development and psychological support of young footballers.

S12.3
The influence of perfectionism on psychological well-being in soccer
Esmie Smith(1,2), T Donachie(1), HK Hall(1), AP Hill(1)
(1) York St John University (YSJ), York, UK
2) University College of Football Business (UCFB), Burnley/Wembley, UK
The purpose of this paper is to present evidence for the potentially debilitating psychological effects of perfectionism within the footballing environment, and suggest how the effects of perfectionism may be compounded by the achievement environment in which soccer players perform. Many young boys begin playing soccer with the aim of becoming a professional player. However, in reality, very few will achieve this goal. In the UK, for example, less than 1% of the estimated 10,000 boys involved in soccer academies as juniors are awarded a professional contract. As a result, the footballing environment can be extremely challenging and, for some, have a heavy toll on psychological well-being potentially leading to stress, burnout and depression. Some have argued that perfectionism is a key attribute if one is to become a successful elite athlete. However, early indication from research in sport suggests that the effects of perfectionism are complex and may contribute to poorer psychological well-being. This presentation will provide an overview of the conceptual basis for perfectionism and a summary of research from sport and other comparable achievement contexts that have illustrated the key mediators and negative effects of perfectionism, which may be exacerbated in the competitive soccer environment.

S12.4
Reaching the youth academy level in German football: the relevance of motor and psychological predictors

Oliver Höner, P Feichtinger, D Murr
Eberhard Karls University of Tübingen, Institute of Sports Science, Tübingen, Germany

This prospective cohort study examines the prognostic relevance of talented football players’ motor and psychological characteristics assessed in early adolescence (U12) with regard to middle adolescent performance level (U16). The sample consists of competence centre players of the German Football Association’s talent development programme (top 4% of all eligible German players). In total, 1701 and 1804 U12 players (born in 1999) participated in the psychological and motor diagnostics at two measurement points in the 2010/11 season. Performance tests measured speed abilities and technical skills and their results were combined into a motor performance score. Self-report questionnaires captured altogether 17 psychological personality characteristics addressing the areas of motivation, volition, self-referential cognition and emotion. Four years later, players’ performance level in U16 was assessed by examining whether the individuals were selected for professional clubs’ youth academies in the 2014/15 season (about 9% of the sample reached this level). The results reveal a significant prognostic relevance of the motor performance score, and – to a lesser extent – of individual personality characteristics. Furthermore, hierarchical logistic regressions show that personality characteristics (e.g., achievement motive 'hope for success', volitional skill 'self-optimisation') extend the explained variance gained from the motor performance. As a consequence, personality characteristics complement the predictive value of motor performance. These results provide important insight regarding the scientific support of talent development. However, based on the current state of research, such characteristics should not be used for a deterministic selection of talents (in terms of fixed cut-off values).
S12.5
Starters and non-starters in football: differences in cohesion perceptions
Ioannis Zarotis(1), K Papailia(2), F Dimoula(1)
(1) National & Kapodistrian University of Athens, Greece
(2) Panteion University of Athens, Greece

The balance in a football team depends on the cohesion of its members. In particular, non-starters players appear to play an important role in the team’s cohesion since their participation time is below expected, thus “have the chance” to express their disappointment more freely, doubting the cohesiveness of the team. The present study aims to explore the perceptions about team cohesion that are held by the starting lineup players and the bench players among various teams. The sample is 124 football players from 5 different teams and between the age of 15 to 19 participated in the study. Athletes completed the Greek version of the 18-item Group Environment Questionnaire which measures task and social (two dimensions) cohesion in four factors: Attractions to the Group-Task, to the Group-Social, to the Group Integration-Task and to the Group Integration-Social. The results demonstrated statistically significant differences on perceptions of cohesion among starters and non-starters players especially on the factor of Attraction to the Group Task, indicating that substitute players hold the perception that their participation is not very important to the progress of the team. The findings are in line with previous literature on the players’ attitude during the game according to their participation time. These findings suggest that coaches should praise the role of the substitute players as well as their contribution to the team’s progress because for each well trained first team player there is a substitute that tries hard during the training.

12:00 - 13:00
S13 HEALTH - PSYCHOLOGICAL PERSPECTIVE

S13.1
Flow experiences in football: the key to a successful physical activity intervention?
Anne-Marie Elbe
NEXS, University of Copenhagen, Department of Human and Social Sciences, Copenhagen, Denmark

Flow is a state of consciousness during which people become totally immersed in an activity and feel simultaneously cognitively efficient, motivated, and happy. This psychological state is perceived as so rewarding that it motivates individuals to repeat activities. This presentation will investigate the importance of flow experiences for participants involved in football physical activity interventions. Questions that will be discussed are e.g. which levels of flow can be achieved during football training and how do they compare to flow levels experienced in other types of physical activity training interventions, is experiencing flow connected to physiological improvements during the training intervention, and is experiencing flow connected to adherence to regular physical activity after the end of the intervention? Data from studies comparing a football training intervention for previously inactive individuals to other training forms (e.g. running, strength training) as well as data from a study comparing the effects of a workplace intervention for 65
female health care workers who participated in either football or zumba will be presented. The results of these studies indicate that football training is a flow eliciting activity also for previously inactive participants and that flow experiences are related to the adherence to regular physical activity following an intervention.

S13.2
Football on prescription? Football's potential for exercise adherence
Peter Elsborg, J Wikman, G Nielsen
Center for Team Sport and Health, NEXS, University of Copenhagen, Denmark

Objective: To explore the potentials of football and other team sports regarding motivation for and adherence to exercise.

Methods: A qualitative focus group study of middle-aged and elderly men who participated in exercise interventions involving playing either a ballgame (football) or a more individually focused exercise (spinning and crossfit). A quasi experimental study on differences in intrinsic motivation, flow experiences and exercise continuation among menopausal women doing either individual exercise (spinning) or playing a ballgame (floorball).

Results: The qualitative study shows how different social, organizational and material structures inherent in the different activities shape the subjects’ enjoyment of exercise participation, as well as their intention and ability to continue being active. It points to the conclusion that, football as a team sport activity is more intrinsically motivating for the participants through positive social interaction and play. It also indicates that in spite of some strong organizational barriers to elderly people football is more likely to result in exercise continuation than activities that rely primarily on extrinsic motivation such as the expectation of improved health and well-being. These findings are supported by results from a quasi-experimental study where women playing a ballgame instead of conventional individual exercise in a group/class developed higher levels of intrinsic motivation for the activity, higher levels of flow and the participants enjoyed the activity more.

S13.3
An investigation in the characteristics of mental health in athletes with a special focus on football players
Frank Weiland, K Siefken
Medical School Hamburg (MSH), Department of Mental Health, Hamburg, Germany

Background: Research indicates that sport can enhance mental health. However, it remains unclear under what circumstances and in which context. Numerous hypotheses have been developed, based on physiological as well as psychological approaches. Mental health is measured by valid depression or anxiety questionnaires. This article investigates the differences in prevalence of depression and anxiety between athletes and the standard population.

Methods: 691 participants filled out an online-questionnaire that sought to understand the characteristics of mental health in athletes. Findings were compared to public data from the standard population.
Findings: The participants` mean age is 27 years for only football players and 34 years for athletes of other sports. Compared to studies that focussed on a standard population, the mean score used for depressive symptoms was higher and the mean score on the questionnaire for anxiety was lower in this sport-centered study than in the standard population. Football players of both genders score higher on depression and anxiety than athletes of other sports do. Those athletes who mainly exercise outside and/or who belong to a team show less depressive symptoms than those who mainly exercise inside and/or athletes from individual sports.

Conclusion: Athletes differ in their level of depression and anxiety from the standard population. Athletes from different types of sports show different depression and anxiety scores. Further research is needed to investigate in the specific reasoning of these findings. Special attention should be given on the high depression scores herein detected in football players.

12:00 – 13:00
S14 ORGANIZATION, ECONOMICS AND POLITICS - PART I

S14.1
Tensions in the emergence of bio-therapies and regenerative medicine for musculoskeletal injury in elite football
Alex Faulkner(1), J Gabe(2), C Coveney(1), M McNamee(3)
(1) University of Sussex, School of Global Studies, Brighton, UK
(2) Royal Holloway University of London, UK
(3) Swansea University, UK

Background: In the context of the biomedicalisation of sport, a range of biological and cellular therapies such as stem cells and platelet-rich plasma are being debated, and in some cases used therapeutically. Regenerative medicine is the subject of huge private investment and governments’ investment. Some international producers of regenerative products address markets in sports medicine, and more specifically, for example, ‘orthobiologics’.

Objectives: The paper reports research drawing on sociological, science & technology studies (STS), and philosophical ethics approaches to map and analyse the emergence of bio-therapies in contexts of commercialisation, evidence based medicine, and elite football culture and ethics. The aim is to show, amongst lead sports medicine practitioners’ and physiotherapists’ practices and policies, first: the commercial, scientific, club, insurers’ and other stakeholders’ perspectives on appraisal and use of regenerative bio-therapies, and second: to illustrate some of the typical decision-making emerging, and dilemmas and ethical issues raised.

Method: The paper draws on early data from a UK Economic and Social Research Council (ESRC) funded project running from 2013 to 2016. Data comprise scientific journal articles, observation of sports and football medicine conferences, interviews with sports medicine section leads at English Premier League football clubs, orthopaedic surgeons and sports/football association medical officials.

Results/Conclusion: In spite of modest evidence for efficacy, and conservative medical policies, some biotherapies are increasingly used, sometimes as intended, sometimes to counter club and player pressures. Different parties position themselves differently in relation to these tensions. Not all bio-therapies target return-to-play as opposed to long term welfare.
S14.2
From soccer school to campus soccer: the transitions of government policy for youth soccer from 1994-2014 in China
Fuquan Lu(1), N Li(1), S Jia(2)
(1) Peking University, Department of Sports Science, Beijing, PR China
(2) Beijing Pukkan Medical Co.Ltd., PR China

Disappointing performance of Chinese national soccer team and youth soccer team recent year triggered intensive argument about the youth soccer policy in China. The study focused on the government policy on youth soccer player developing in the last two decade in China. Intensive literature review (CNKI data base) and second hand data analysis were made. Three major transitions were found in the youth soccer development. From 1994, encouraged by Chinese economic reform policy and prosperity of professional soccer development, the number of private enterprise soccer school overtook the public ones. But because of the running philosophy of profit chasing and lack of government macro-adjustment, the number of those private soccer schools shrinked from 2001. Criticism on soccer school and voice urged youth soccer player back to general school triggered the second transition in 2009. With the foundation of National youth Campus Soccer Program Administrative office, National Sports Bureau started to work with National Education Bureau to promote youth soccer population in general schools. While National Sports Bureau still encountered the criticism and embarrassment because of its competition orientation and lacking of authority in education system. Third transition occurred in November 2014, State Council teleconference on campus soccer established the National Bureau's leading position and campus soccer transformed to a grassroot and fitness oriented one.

Key words: youth soccer, soccer school, school soccer, campus soccer, policy, China

S14.3
An analysis of football-specific economics processes and its social values
Ratu Tisha Destria, H Maulana
Labboa Sports Co., Jakarta, Indonesia

The research examines the topic of economics processes in football organization. As football grows into a sophisticated industry with the use of big data, the complexity of management and economics processes in this area are becoming more challenging. Football, as it carries a heavy value of social and humanity factor from the root of sports itself, has a unique aspect to be considered compare to any other businesses. There are two research objectives; to understand whether commonly used economics processes such as Euler Theorem and Fermat’s principle in the commercial world is applicable to monitor and evaluate the economics condition in the football industry and to understand whether there is a unique economics processes of football industry. The methodology consist of two steps; literature review from both commercial world and football world and a qualitative analysis interview sample of 4 football organization form in 4 different countries; Indonesia, Italy, England, and USA. The result of the research are the unique social and humanity factor that football has, drive the economics processes to be managed differently compare to the
commercial world. This concludes that an organization in a football industry will optimize their adopted-economics methods from other industries only if it simultaneously aligns with setting up the communication and resource management system.

13:45 - 14:15
KP02 KEYNOTE PLENUM

KP02
The emergence and diffusion of 'Football': a case study in the globalisation of sport
Joseph Maguire
Loughborough University, School of Sport, Exercise and Health Sciences, Loughborough, UK

This paper will outline the key stages in the emergence and diffusion of 'football'. Attention is given to the key stakeholders, key factors and key global flows that help shape and influence the globalisation of European / british ball games. Major developments within Britain, within Europe and within the formal and informal British Empire are highlighted. The paper concludes with a consideration of the contemporary structure of global 'football'.

14:30 - 15:45
S15 COACHES - SITUATIONS AND CAREERS - PART I

S15.2
The changing nature of English professional football academy coaching in light of the implementation of the EPPP
Jimmy O'Gorman, M Partington
Edge Hill University, Department of Sport & Physical Activity, Ormskirk, UK

The Elite Player Performance Plan (EPPP) was devised in 2011, and is currently being implemented nationwide across all professional English football academies. It sets out to ‘modernise’ and nationally benchmark the youth academy system of professional football clubs, whereby coaches are regularly externally audited and inspected against a series of key criteria. This study draws on the concept of performativity (Ball 2003) on a set of 10 informal semi structured interviews with coaches from 2 professional football club academies to understand how coaches are managing the changing demands of their role in light of the policy priorities of the EPPP. Such developments in English professional football represent something of a cultural shift, with new policies having potential implications for the expectations placed on the role of the academy coach. Academy coaches are expected to systematically engage in activities beyond the practice of coaching players in training sessions and games. More detailed and expanded administrative work to evidence, and measure the outcomes, of their practice is required. Work is becoming intensified, more discrete within an increasingly complex division of labour (Malcom, Pinheiro & Pineta, 2014), and the coach is becoming more accountable through increasing surveillance (Taylor & Garrett 2010) of their work. As such, the EPPP could be explained as part of the extension of neo-liberal managerialism in the burgeoning sports coaching profession (Taylor & Garratt, 2010, 2013), as
academy coaches and their activities are becoming increasingly subject to the measurement of their performance to evidence ‘value for money’.

S15.3
Male top-level football coaches’ attitudes concerning top-level female coaches

Trond Svela Sand, K Fasting, MK Sisjord
Norwegian School of Sport Sciences, Department of Cultural and Social Studies, Oslo, Denmark

Football is by far the most popular organized sport among Norwegian women today and the female national team has had great international success for more than two decades. However, similar to most other sports both nationally and internationally, women are under-represented as coaches particularly at the high performance levels. The under-representation of female top-level coaches throughout sport has been recognized by scholars since the late 1980s and is typically explained by a masculine sport culture dominated by men. This however leaves a rather one-dimensional impression of both men and masculinity in top-level coaching. Correspondingly, the voice of male coaches seems to be unreported in the research and we thus found it interesting to know more about their perceptions and attitudes relative to the under-representation of women in top-level coaching.

The objective of this paper is to explore male top-level football coaches’ (n=21) perceptions and attitudes with respect to female coaches. The results presented are taken from an online survey which was part of a larger Norwegian study among female and male top-level coaches (n=309) from different sports. Two open-ended questions addressing the under-representation of female coaches and 12 items measuring attitudes towards female coaches were analyzed. The results showed that there were diverse perceptions and attitudes towards female coaches in this group of male football coaches, and indicate that the need for talking about masculinities in light of R.W. Connell’s work. Potential meaning for the recruitment and retention of female football coaches in the future will be discussed.

S15.4
‘Why am I putting myself through this?’ Women football coaches’ experiences of The Football Association’s coach education process

Colin Lewis, S Roberts, H Andrews, P Vickerman
Liverpool John Moores University, Department of Education, Health and Community, Liverpool, UK

In recent years, there has been a significant increase in the provision of formal coach education. However, research has shown that coach education has a limited impact on the learning and development of coach practitioners. To date, however, these studies have tended to avoid female populations. Ten women football coaches who held a range of coaching qualifications and who had attended various coach education courses, participated in this study. Following the analysis of a series of semi-structured interviews the findings revealed high levels of gender discrimination. The women’s experiences are discussed in line with the notions of power, symbolic language and violence and social acceptance. The participants provided numerous recommendations for future
formal coach education provision which they consider would essentially enhance the number of women football coaches who enter and progress through the coach education process.

S15.5
What makes an elite under 13 player? The attributes talent identifiers consider important for elite youth performance
Paul Larkin, D O'Connor
The University of Sydney, Faculty of Education and Social Work, Sydney, Australia

The attributes that contribute to skilled performance in soccer have been widely investigated, however, there is still limited understanding of what attributes elite youth talent identifiers look for when identifying elite youth players. Therefore, this investigation used a modified Delphi research method to understand what attributes elite youth talent identifiers consider important for elite performance at an under 13 level. Australian state youth technical directors (n = 8) and under 13 state team coaches (n = 12) completed a three stage process, including an initial interview and subsequent questionnaires, whereby each identified attribute was rated according to the importance to elite youth player performance. Results indicated elite youth talent identifiers consider technical skills, such as first touch, the ability to strike the ball and ability in an attacking and defending one versus one situation, as the most important attributes to consider when identifying elite under 13 players. The findings make a significant contribution by providing the initial evidence to suggest Australian elite youth talent identifiers consider technical skills more important for elite youth under 13 players, compared to physical (e.g., speed, power), tactical (e.g., decision-making, anticipation, game understanding), and psychological (i.e., attitude, confidence) attributes.

14:30 - 15:30
S16 CAREER PATHWAYS AND TALENT DEVELOPMENT - PART I

S16.1 Role of mentorship in an effective talent development environment for a female recreational soccer club
Peter Schneider
Leipzig University, Department of Sport Science, Leipzig, Germany

The number of women involved in soccer in Germany has doubled in the last ten years, yet young women continue to dropout early from the sport. Environmental Success Factors (ESF) in elite youth soccer have been shown to increase later success in the sport. Therefore this study seeks to 1) identify a successful talent development environment in women's youth soccer, 2) identify the role of mentors in increasing life-long interest in playing soccer, and 3) provide an applicable structure for other female soccer clubs. Methods included multiple interviews regarding experiences of players, coaches, parents, and staff in and around the club environment. Players from the 1st and 2nd women's teams were given mentorship roles involved in U17 and U15 practices, and U17 players were involved in social activities with the women's teams. Many ESF in elite soccer were
found at the studied women’s soccer club, including cultural factors, a close family feeling, focus on development and not results, and a holistic development. Players from the women’s teams felt they gained perspective through the mentorship, while the youth players appreciated the attention and had greater interest in coming to practice. It is possible to use elements from an successful elite environment and apply them to recreational teams, increasing enjoyment and adding structure to the club. Having adult players as mentors for youth can be difficult due to time constraints, but contact between adult and youth players can lead to increased interest and greater commitment.

S16.2
Talents on the pitch: anxiety and action-orientation after failure
Stephan Horvath, D Birrer, G Morgan, J Portmann, P Röthlin
Swiss Federal Institute of Sports, Magglingen, Switzerland

Talent programs are common in soccer. Next to physical, technical and tactical factors psychological characteristics are regarded as crucial in reaching elite and mastery levels in soccer. Two factors that are considered as very important for success are performance anxiety before and during a game as well as how players react to setbacks on the pitch. The present study examines whether soccer players of the Swiss Football Association talent program FOOTURO differ from players not selected to the program in how they experience and appraise anxiety as well as how they react to failures during competitive soccer games. Over the last ten years FOOTURO-Players (n=54) completed different sets of psychological questionnaires, including measures of anxiety (WAI-T) and action orientation (HOSP). Both measures were also used in a nationwide data collection with young soccer-players (n=414). Statistical analyses showed that FOOTURO players revealed less somatic and cognitive anxiety, and interpreted the former as less performance relevant and the latter as more performance impairing as their soccer peers. In addition, their reaction to failures is much more action-oriented, i.e., they keep playing and fighting, and are less distracted by rumination. Revealing important differences between the most talented players and their peers, the findings indicate that these psychological factors might be relevant for a successful career start as a professional soccer player or that players develop these traits during the talent program. However, low anxiety and high action orientation should therefore be encouraged by sport psychologists and coaches.

S16.3
Relative age effect and birth place effect in Danish national youth football
Niels Nygaard Rossing, A Flattum, A Biegel, DS Karbing
Aalborg University, Department of Health Science and Technology, Aalborg, Denmark

Objectives: Studies have shown that environmental factors significantly affect the likelihood for athletes to reach elite level in sport. The relative age effect (RAE) and birth place effect (BE) refer to the relationship between elite status and an individual’s month of birth relative to their peers and place of birth, respectively. RAE has been shown consistently across different nations and most sports, while results in BE have been varied. Our objectives were to examine RAE and BE in Danish male national youth team players (NYP) in football.
Methods: The sample included 85 Danish NYP ranging from U16-U21 national youth teams in 2013 and 145021 registered male youth players. Birthplace communities were divided into six subdivisions by population density and odds ratios (OR) were calculated comparing the odds for being a NYP with odds for being a registered youth player from each category. OR results were considered significant if 95% confidence intervals (CI) did not include 1. Chi-square analysis compared the distribution of NYP across birth quarters with the expectation of equal player distribution.

Results: NYP were overrepresented in high density communities (≥1000 pop./square km) (OR[CI]) (2.90[1.81-4.65]), and underrepresented in low density communities (<50, and 50-100) (0.18[0.06-0.58] and (0.41[0.20-0.82]). Player distribution from 1st to last birth quarter was 39-25-28-8 % with a significant RAE (P<0.01).

Conclusions: The results indicate that both population density of the birthplace community and the relative age are related to the talent development process suggesting that material or psychosocial barriers in the environment exist in Danish football.

S16.4
Overconfidence and performance level in elite youth soccer players
Erik Hofseth, T Toering(1), G Jordei(1), A Ivarsson(2)
(1) Norwegian School of Sport Sciences, Department of Coaching and Psychology, Oslo, Norway
(2) Halmstad University, School of Health and Welfare, Halmstad, Sweden

Research from general psychology has demonstrated that when peoples’ self-confidence level has been compared to their actual performance level, self-confidence tends to be negatively related to performance in participants who overestimate their abilities. The current study investigated the relationship between overconfidence and future performance level in elite youth football players (N = 268, Mage = 17.8, SD = 1.1). Overconfidence was estimated by comparing players’ perception of their skill level with the coaches’ perception of players’ skill level. This comparison was used to predict which players played international matches the following two years. While controlling for age and past record of international matches, a multinomial regression analysis (X² (6, N = 266) = 46.66, p < .01) revealed that the players who to the greatest extent overestimated their skill level had a reduced chance of playing international matches, in comparison to other players (OR = 0.24, p < .01, 95% CI = .09, .61). Furthermore, a series of binominal regression analysis, revealed that overestimating physical skills was mostly debilitating for defensive players (OR =.08, p < .01, 95% CI = .01, .67), while it was mostly debilitating for midfielders to overestimate their mental skills (OR =.17, p < .01, 95% CI = .05, .52). In summary, these results indicate that an overestimated skill level is associated with a low future performance level, particularly in relation to skills that are highly relevant to a player’s playing position.

15:45 - 17:15
S17 TRAINING - PART I
The “Centimax” Borg Scale: validity and interchangeability with CR10® for Session-RPE in soccer

Maurizio Fanchini(1,2), I Ferraresi(3), R Modena(1), F Schena(1), AJ Coutts(4), FM Impellizzeri(5)
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(5) Research & Development, Schulthess Clinic, Zurich, Switzerland

The Borg CR10® scale is frequently used to calculate the Session-RPE (S-RPE) that is a valid measure of internal training load in soccer. The Borg Centimax (CR100®) scale has been suggested to provide more accurate ratings compared to CR10®. The aims of this study were to examine the validity of the CR100® and to assess its interchangeability with the CR10® in soccer. The CR100® validity was assessed in elite (SerieA) Italian players (n=19, age 28±6 yrs, height 180±7 cm, weight 77±6 kg) by correlation with the Edward’s heart-rate method. Interchangeability with CR10® was assessed in junior and semi-professional players (n=78, age 19±4 yrs, height 178±6 cm, weight 71±6 kg) by correlation between change scores in different sessions, Bland & Altman Method with limits of agreement (LOA) and comparisons of percentage responses given at verbal expressions. Individual correlations between Edward’s method and S-RPE were large to very large (r=0.58, p=0.008 to r=0.85, p<0.008). The mean difference between CR10® vs. CR100® was -0.3±0.3 AU (90%CI -0.41,-0.29) with 95% LOA 0.31 to -0.96 AU. Correlation between two scales was r=0.95 (p<0.0001). Correlations between changes scores were nearly perfect (0.91 to 0.98, p<0.0001). Ratings matching the verbal anchors were 49% and 24% in CR10® vs. CR100®, respectively. The CR100® is valid to assess internal training load and interchangeable with the CR10®. The CR100® shows a wider numerical range, more fine-graded scores and association to a percentage scale. Therefore, the use of the CR100® can improve the quality of monitoring the training process in soccer.

Contribution of planned and unplanned training to overall load in elite youth female football players

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Objectives: When working with youth athletes planned manipulation of training load is of great importance. However, these athletes often partake in activities not planned by coaches, which may result in an excessive training load. This study investigated the contribution of ‘planned’ and ‘unplanned’ training to overall training load in a group of elite youth female football players.

Methods: Thirty-five female football players (aged 13-16 years) from an ‘FA Centre of Excellence’ were required to keep a training diary over a 34-week period, from which training load was calculated (as session duration multiplied by global rating of perceived exertion). Additional exercise such as school-based physical education sessions, or participation in other sports were
included within the diaries. The contribution of planned (‘football’ and ‘strength and conditioning’ training) and unplanned training (any ‘additional exercise’) to overall load was calculated. Results: Mean compliance rates of players providing >17 weeks’ of data was 32%. Only players providing >17 weeks of data were included in the analysis. Mean weekly training load was 2157 ± 454 (arbitrary units), distributed as 36.5 ± 13.3% ‘football’, 27.6 ± 12.2% ‘strength and conditioning’ and 35.9 ± 9.5% ‘additional exercise’. Unclear effects were observed regarding seasonal variation of ‘football’, ‘strength and conditioning’ and ‘additional exercise’. Conclusions: The training loads undertaken by youth female football players does not reflect that planned by coaches, with more than a third consisting of unplanned training. Compliance of youth female players in providing training load data is also a problematic area.
S17.3
The effect of sequencing strength and endurance training in young soccer players
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This study examined the effects of Strength and Endurance training sequencing on relevant fitness variables in youth-soccer. Fifty-seven young elite-level male field soccer players (age: 13.7±0.5 years; height: 164±8.3 cm; body mass: 53.5±8.6 kg; body fat: 15.6±3.9%) were randomly assigned to a control (n=14, CG), and three experimental groups training (twice a week for 12 weeks) S prior to (SE, n=15), after (ES, n=14) or on alternate days (ASE, n=14) with E. Results showed a significant (p=0.001) intervention main-effect. The CG showed large ($\eta^2$) Squat 1RM and medium sprint, change of direction ability and jump improvements. Post-training ES vs SE differences were trivial, for all variables (p>0.05). ASE demonstrated a trivial difference in E performance with ES and SE (p>0.05). Large to medium difference were reported between ASE and either SE or ES for sprinting over 10 and 30m (p<0.02). The SE Squat 1RM was higher than in ASE (moderate, p<0.02). Post-intervention differences between ES and SE with CG fitness variables were small to medium (p<0.05) except for Yo-Yo intermittent recovery test with the SE (p<0.001, Large). This study results showed no effect of intra-session training order on soccer fitness-relevant variables. However the intra-session method showed a superior effect on the considered variables compared to alternated days strategy. Concurrent training may be considered as an effective and safe training method for the development of the perspective soccer player.

S17.4
The utilization of video self modelling for the training of non-preferred side kicking in soccer
Kylie Steel
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Team sports players benefit from bilateral skills but must attend to this outside of coach led training sessions due to time constraints. Video Self Modelling (VSM) has been effective in many movement domains however it has not been used to explore bilateral training in soccer and may provide a solution here. Therefore, the purpose of this study was to investigate the use of VSM for the improvement of non-preferred side kicking.

Methods: N=33 females participants (19-42 years) volunteered to perform 26 trials (13L, 13R), kicking toward a target 15m away while also being filmed. This footage was used as a training stimulus in groups one and two, group three was a control, where group one observed video footage of their preferred foot reversed in addition to physical practice (PP) with their non-preferred foot, group two differed only in that their footage was of their best non-preferred examples. Group three completed PP only.

Results and Discussion: Analysis of pre/post data showed accuracy significantly improved with the preferred foot overall (M=37cm), however this was not significantly different between training
groups. However group two data showed that both feet increased in accuracy, as opposed to groups one and three where the preferred decreased as the non-preferred improved.

Conclusion: VSM training and physical practice attain similar results however when participants view the best examples of their non-preferred foot footage they are able to minimize decreases on their preferred foot. That is both feet improve together rather than at the expense of each other.

S17.5
The influence of high-intensity training volume on global training loads and recovery of international football players
Tae-Seok Jeong(1,2), Y-S Lee(1), J Bartlett(3), B Drust(2)
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High-intensity training volume (HITV) plays a significant role on aerobic fitness development of elite football players. This study aimed to examine the influence of HITV on global TL and perceived recovery of elite football players. Fifteen U-20 international players (age 19.3±0.6 years, height 1.78±0.06m, body mass 68.8±7.0 kg) were observed during 10-training days in pre-competition camp. Time spent in 85~100% of maximal heart rate was used as an indicator of HITV. Global TL was calculated by multiplying the rating of perceived exertion (RPE) by the duration of each session. Recovery status was assessed in each subsequent morning using total well-being (TW) questionnaire including five subcategories; fatigue, sleep quality, muscle soreness, stress levels and mood. A simple linear regression analysis was conducted to determine if the global TL (dependent variable) could be predicted from HITV (independent variable) and to see if recovery variables could be predicted from HITV (independent variable). Data suggested that approximately 24% of the variance in the global TL was predicted by HITV (F=54.689; p=0.000). HITV also significantly influenced recovery variables of players, explaining 8%, 15% and 18% of the variance in TW (F=15.345; p=0.000), fatigue (F=30.329; p=0.000) and muscle soreness (F=36.841; p=0.000), respectively. There was a significant influence of global TL on the variance of TW (F=27.693; p=0.000), fatigue (F=74.460; p=0.000) and muscle soreness (F=15.710; p=0.000) of 14%, 30% and 8%, respectively. High-intensity training volume appears to partially influence global TL and perceived recovery of football players but may not be a main predictor of those variables.

S17.6
Effects of speed-endurance training in elite female soccer players on performance and muscular adaptations
Thomas P Gunnarsson, C Ørntoft, J Bangsbo
University of Copenhagen, Department of Nutrition, Exercise and Sports, Copenhagen, Denmark

Purpose: We examined the effects of speed-endurance training (SET) in-season on performance and muscular adaptations in elite female soccer players from a Danish (BIF) and Swedish (Malmø) top-
Methods: 28 elite female soccer players participated from an intervention (BIF; n=13) and control (Malmö; n=15) team. In BIF, weekly SET (5-9 near-maximal 30-s intervals) replaced part of the training for 9-wks (INT). Before and after INT, players performed the Yo-Yo intermittent recovery-test level 1 (YYIR1), a sprint (10- and 30-m) and an agility test, and six players from BIF had a resting muscle biopsy taken.

Results: In BIF, expression of the Na+/K+ pump subunit β1 increased by 7% and MCT4 expression decreased by 14%. Maximal enzyme activity (CS, HAD and PFK) did not change by INT, but when compared to sub-elite male soccer players, BIF had lower (p<0.05) oxidative enzyme activity (CS and HAD). In BIF, YYIR1 performance only improved (8±3%) from pre-season to after INT. 30-m sprint performance improved by INT while 10-m sprint and agility performance did not. No change in performance was observed in Malmö, but 30-m sprint and agility performance was better than in BIF, both before and after INT.

Conclusion: In conclusion, adding SET in season in elite female soccer players improves 30-m sprint performance with a concomitant increase in Na+/K+ pump β1 subunit and decrease in MCT1 content. Elite female soccer players in Denmark have inferior physical capacity compared to players in Sweden and lower oxidative enzyme capacity compared to sub-elite male soccer players.

15:45 - 17:15
S18 CHILDREN

S18.1 Cardiovascular adaptations to football in children
Peter Riis Hansen
Gentofte University Hospital, Department of Cardiology, Copenhagen, Denmark

Childhood obesity is increasing on a global scale and linked to children’s relative absence of moderate-to-vigorous physical exercise. Obese children have reduced physical capacity and display more cardiovascular risk factors, e.g. hyperlipidaemia and hypertension, and subclinical cardiovascular abnormalities including endothelial dysfunction and increased carotid intima-media thickness. Such clustering of cardiovascular risk factors in childhood track into adulthood and increases the risk of cardiovascular disease, e.g. myocardial infarction and cardiovascular death. Obese children also display abnormalities of myocardial structure and function, e.g. increased left ventricular mass and impairment of diastolic filling. Short-term interventions with increased physical exercise in obese children can ameliorate some of these abnormalities but there is a paucity of data on the relative efficacy of different physical exercise interventions and on factors that influence long term adherence to physical exercise in children, respectively, although high-intensity interval training and school-based interventions may be of particular value. Limited evidence is also available on the effects of physical exercise on cardiovascular parameters on a population scale in children. However, recent results have indicated that in 8-9-year-old school children, short-term small-sided football training elicits higher average heart rates and increased physical capacity compared to other training types, e.g. circuit training. Moreover, short-term school-based football training can induce myocardial adaptations, e.g. increased left ventricular posterior wall diameter
and increased isovolumetric relaxation time. Additional studies are required to shed more light on cardiovascular adaptations to football in children and their consequences for long-term health.

S18.2
The relative age effect in German national youth football
Sabrina Skorski(1), S Skorski(2), O Faude(3), D Hammes(1,3), T Meyer(1)
(1) Institute of Sports and Preventive Medicine, Saarland University, Saarbrücken, Germany
(2) Department of Sport Science, University of Freiburg, Germany
(3) Department of Sport, Exercise and Health, University of Basel, Switzerland

Objectives: The over-representation of athletes born early in the year has repeatedly been reported (relative age effect (RAE)), with physical advantages (anthropometry and performance characteristics) as most likely responsible for the effect. Thus, we investigated if such a difference between birth quarters (BQ) is evident in elite German youth football and if BQ affects the chance to become professional.

Methods: 554 youth players, tested between 2007 and 2011, were divided into 6 age groups (U16-U21), each of them subdivided into 4 BQs. Each player performed at least one 30-m sprint test, a counter movement jump (CMJ) and an incremental running test to determine the individual anaerobic threshold (IAT; indicator of endurance capacity). for players performing more than one test within a team, the best one was included. Some players were part of different teams, thus 832 data sets were analysed.

Results: More players were born in BQ1 compared with all others (p<0.05). No significant difference between BQs could be observed for any anthropometric variable (p>0.07), sprint time, CMJ or IAT (p>0.18). Players born in BQ4 were more likely to become professional compared to BQ1 (odds ratio: 3.04).

Conclusion: A large RAE exists in elite German youth football but it is not explained by an advantage in anthropometric or performance-related parameters. Younger players selected into national teams have a greater chance to become professional later in their career. They possibly compensate selection disadvantages with greater commitment or have greater talent when selected because they have to ‘stand out’ against older players.

S18.3
Influence of biological maturity on the match performance of 8 to 16 year old elite male youth soccer players
Heita Goto(1), J Morris(2), M Nevill(2)
(1) Faculty of Sports Science, Kyushu Kyoritsu University, Kitakyushu, Fukuoka, Japan
(2) Sport, Health and Performance Enhancement (SHAPE) Research Group, Department of Sport Science, School of Science and Technology, Nottingham Trent University, UK

The aim of the present study was to examine the influence of biological maturity on match performance in elite youth soccer players. The participants were 102 Premier League Academy field players (8-16 years old). Biological maturity was determined by calculating estimated chronological age at peak height velocity. The U9 and U10 squads played 6 a-side and the U11-U16
squads played 11-a-side matches. All matches were analysed using a 1 Hz Global Positioning System (SPI elite, GPSport, Australia) with squad specific speed zones which were calculated based on 5 m flying sprint speed in the last 5 m of 10 m sprint test. In the U9/U10s, earlier maturers were given a longer pitch time by coaches (~4 min per match, p < 0.05) and covered a greater total distance (~9%, ~400 m, p < 0.05) and a greater distance by jogging (~12%, ~200 m, p < 0.05) during a match compared to later maturers. In the U13/U14s, earlier maturers covered a greater distance per hour of a match by high speed running compared to later maturers (~25%, ~130 m, p < 0.05) and spent a longer percentage of time in high speed running during a match compared to later maturers (3.4% vs. 2.7%, p < 0.05). Thus, coaches should take care to provide all players with a similar pitch-time and should be aware in the talent identification and development process, particularly with the U13/U14 age group, that maturity can influence high speed match running performance.

S18.4
Age-related differences in body size, maturity, fitness, and playing performance in junior Australian football
Paul Gastin(1), C Tangalos(1), S Robertson(1,2)
(1) Deakin University, Melbourne, Australia
(2) Victoria University, Melbourne, Australia

Introduction: Player characteristics and match performance statistics in junior sport are not well documented, particularly at the lower levels of the participation and performance pathway. The purpose of this study was to investigate age-related differences in body size, maturity, fitness, and playing performance in junior Australian football (AF).

Methods: Junior male AF players (n = 156) were recruited from 12 teams across six age groups (U10 – U15) of a single amateur recreational AF club. All players were tested for size (body mass and height), maturity (years to peak height velocity; YPHV) and fitness (20 m sprint, vertical jump, 20 m shuttle run). Player performance was assessed during a single match in which disposals (kicks and handballs) and their effectiveness were coded from a video recording.

Results: Significant main effects (p<0.01) for age group were observed for age, body mass, height, YPHV, 20 m sprint, vertical jump, 20 m shuttle run and effective disposals (number and percentage of total). The only variable that did not improve with age was the number of disposals.

Conclusion: Age-related differences are evident in body size, maturity and fitness in junior AF players. Differences are not evident in the number of disposals, likely a result of players competing directly against their age-group peers in an independent match event. However once in possession of the football, the effectiveness of each disposal (i.e., skill) appears to improve with age. Match statistics may be useful to assess not only performance but also player development over time.
Cardiovascular adaptations to a 10-week low-volume school-based football intervention for 9-10-yr-old children
Malte Nejst Larsen(1), CM Nielsen(1,2), MB Randers(1), T Hornstrup(1), V Manniche(2), L Hansen(3), J Dvorak(4), PR Hansen(5), J Bangsbo(1), P Krustup(1,6)
(1) University of Copenhagen, Department of Nutrition, Exercise and Sport, Copenhagen, Denmark
(2) Gentofte University Hospital, Gentofte, Denmark
(3) Frederikssund Municipality, Frederikssund, Denmark
(4) Team Denmark and Anti Doping Danmark, Brøndby, Denmark
(5) FIFA Medical Assessment and Research Centre (F-MARC) and Schulthess Klinik, Zurich, Switzerland
(6) University of Exeter, Exeter, UK

The present study examined the cardiovascular short-term low-volume, high-frequency school-based football training for boys and girls aged 9-10. As a part of a larger ongoing study, 62 pupils from 3 school classes were cluster-randomised into a football group that carried out an additional 5x12 min 3v3 football training per week for 10 weeks (FG; 3 classes, n=62, 33 boys and 29 girls) or into a control group that maintained their usual activities (CG; 5 classes, n=118, 56 boys and 62 girls). Before and after the 10-week intervention, resting heart rate and blood pressure measurements were performed along with for determination of the effects on cardiovascular health status and heart rate was measured during training for determination of training intensity. No baseline differences were observed between FG and CG in age, body composition, resting heart rate and blood pressure. Average heart rate during football training was 76.2±7.7 (±SD) % of individual HRmax, with 33±22% above 80% of HRmax and 10±9.3% above 90% of HRmax. The individual HRmax was estimated by the YoYo IR1C test to 206.3±7.9 bpm. The intervention-induced changes in resting heart rate were different (P<0.05) between FG 2.5±7.4 bpm and CG 1.9±9.4 bpm. No changes were observed for blood pressure. In conclusion, a low-volume high-frequency 10-week school football intervention elicited high heart rate responses during training and results in lower resting heart rate after 10 weeks.

15:45 - 17:15
S19 RUGBY

S19.1 Epidemiology of rugby injuries
Colin W Fuller
Colin Fuller Consultancy Ltd, Loughborough, UK

Rugby is the second most popular team sport in the world. The sport is played in both 15-a-side and 7-a-side formats: Rugby-15s has a Rugby World Cup every four years and Rugby-7s was recently accepted as an Olympic sport and will be included at the Games in Rio in 2016. Both forms of Rugby are full-contact sports with similar incidences of injury to those seen in other full-contact sports. In 2007, World Rugby called for the development of a consensus statement for
epidemiological studies of Rugby injuries in order to bring worldwide consistency to the recording and reporting of Rugby injuries. World Rugby, the international governing body for the sport, undertakes detailed injury surveillance studies at major international tournaments such as the Rugby World Cup, Junior World Championship and the Sevens World Series: all studies follow the recommended consensus methodology. World Rugby implements an open and transparent policy to the results obtained from all of its injury surveillance studies; hence, all results are presented for open access on the World Rugby Player Welfare internet site. This presentation will describe the physical attributes (stature and body mass) of international Rugby players in Rugby-15s and Rugby-7s and will review whether these parameters have changed over the last 10 years. The epidemiology of injuries sustained at the international level for both Rugby-15s and Rugby-7s will be presented, in terms of the incidence, severity, nature and causes of injury.

S19.2
Effective lineout tactics in high performance rugby union
Jessika Morris, M Sayers, M Stuelcken
University of The Sunshine Coast, School of Health and Sport Science, Sippy Downs, QLD, Australia

A successful lineout is a key component of team success in high level Rugby Union and yet limited research has been published on this key aspect of the game. Accordingly, the aim of this project was to quantify the most successful lineout tactics adopted by high level rugby union teams. All the lineouts (n=2211) from 6 successful Super Rugby teams (2 teams from each conference) completed during the 2014 season were analysed using standard performance analysis procedures. Variables assessed include the location on the field, game time, lineout numbers, pre-throw jumper movements, and throw type and location. Analysis was conducted using both parametric and non-parametric statistical tests. Successful teams won over 88% of their own lineout throws and intercept 16% of opposition throws. Results also showed that 7-man lineouts were the most common, particularly in attacking zones, with 4 and 5-man lineouts being increasingly more common in defensive positions on the field. The most common overall jumper movement was straight up, however, clear trends showed movements to be linked to the location in the lineout where the throw was delivered (e.g. jumpers typically moved forward to take a ball at the front of the lineout, with backward movement being common for balls delivered to the back). Overall, lineout success was shown to be multifactorial and not able to be predicted using simple regression models (i.e. one variable) for these highly successful teams. This study has highlighted the importance of having a variety of lineout tactics to avoid predictable structures.

S19.3
Network centrality analysis may clarify the systematic defence performance of rugby union
Koh Sasaki(1), J Murakami(2), T Yamamoto(3), Y Ueno(4), K Washiya(5), S Tanaka(6), K Shirai(7), M Miyao(8)
(1) Nagoya University, Sports Science Center, Nagoya, Japan
(2) Fukuoka University, Japan
(3) National Defense Academy, Japan
Purpose of this study was to clarify who plays the decisive role at the defensive dimensions in rugby union matches. The analyzing method was the network analysis which suggests the players’ relationship structures in organized group games. In these days ball games have been developed in highly complex mechanism and the network analysis would clarify the evidence of dynamic balance mechanism like a defensive co-operation of team mates. Network analysis has been developed in communication-network studies as a graph theory. The network has structure of both the vertex (players’ positions) and the edge line (co-operation between team-mates in match). It shows which position plays a central role of two (or more) men tackle turnover. Data were derived from 10 matches of close and balanced scores of the international test matches in autumn 2014. Results showed some contributors which mapped centrally in the graph by rugby positions. Positive defence system would be performed by team-mates’ cooperation of successive pressure, cover and communication. The results would also present a strategic and tactical knowledge for planning in the game, practice, and the communication situations concerning team and/or game centrality.

S19.4
Association between injuries and team success in elite rugby union
Sean Williams(1), G Trewartha(1), SPT Kemp(2), JHM Brooks(2), CW Fuller(3), AE Taylor(2), MJ Cross(1), KA Stokes(1)
(1) University of Bath, Bath, Department for Health, UK
(2) Rugby Football Union, London, UK
(3) World Rugby, Dublin, Ireland

The aim of this study was to determine the association between injury measures and team success in elite Rugby Union. A seven season (2006/7-2012/13) prospective cohort design was used to record time loss injuries incurred by 1462 professional Rugby Union players at 15 English Premiership clubs. The linear relationships between team success measures (league points tally and Eurorugby Club Ranking [ECR]) and injury burden measures were modelled, both within (changes in team values from season to season) and between (differences between team values averaged over all seasons) teams. The thresholds for smallest worthwhile change in league points tally and ECR were 3 points and 2.64%, respectively (0.3 of typical variation). Effects were evaluated as the change and difference in the team success measure associated with a two within- and between-team standard deviation increase in injury burden measures. All injury measures had a clear substantial negative association with team success (83-100% likelihood), with the exception of the effect for between team differences in injury days per match on ECR, which had an unclear effect. A reduction in injury burden of 42 days (90% CI: 30 70) per 1000 player hours (22% of mean injury burden) was associated with the smallest worthwhile change in league points tally (+3 league points). These findings highlight the importance for professional Rugby Union stakeholders to understand the
association that exists between injuries and team success, and may be useful when attempting to communicate the value of injury prevention initiatives within this elite sport setting.

S19.5

Performance on the Functional Movement Screen in youth rugby players

Mike Hislop(1), KA Stokes(1), M England(2), SPT Kemp(2), G Trewartha(1)

(1) University of Bath, Department of Health, Bath, UK
(2) RFU, Twickenham, UK

Introduction: Little information describing Functional Movement Screen (FMS) performance exists for youth sport populations. This study investigated FMS performance in a cohort of youth rugby players. Method: 713 male schoolboy rugby players (under 15, n=228; under 16, n=172; under 18, n=313) from 12 schools completed the FMS during pre-season. Differences in overall score and scores for individual movement patterns in different age groups were explored through a combination of a Kruskal Wallis H test with post-hoc Mann Witney U tests.

Results: Total FMS score was significantly higher in the under 18 group (Median, 15; Range 4-20) than both the under 15 (14; 5-19. P<0.01, r=0.20) and under 16 groups (14; 6-19. P<0.05, r=0.11). Scores on several individual movement patterns were also significantly higher for the under 18 group (Deep Squat=2; 0-3; Leg Raise=2; 0-3; Trunk Stability Press up=3; 0-3) than the under 15 (Deep Squat=2; 0-3, P<0.01, r=0.12; Leg Raise=2; 0-3, P<0.001, r= 0.18; Trunk Stability Press Up=2; 0-3, P<0.001, r=0.32) and under 16 groups (Trunk Stability Press Up=2; 0-3, P<0.001, r=0.23). Effect sizes between age groups were small to moderate.

Conclusion: FMS results for a large cohort of youth rugby players indicate the presence of small but statistically significant age-related differences in total FMS score and in several discrete movement patterns. Most notable was greater trunk and shoulder strength in the oldest age group.

15:45 - 17:15

S20

PEDAGOGICAL ISSUES

S20.1

Coaching practice and player development

Donna O’Connor

University of Sydney, Faculty of Education and Social Work, Department of Human Movement and Health Education, Sydney, Australia

When considering player development, it is important to understand the coaching environment, as this is the primary medium for the development of player’s technical and tactical skills (Cushion & Jones, 2001). Recent literature has identified two different coaching methods in sport, a traditional coach-centered approach, and a modern athlete-centered approach (Cushion, 2010; Jones, 2006; Kidman, 2010). In an athlete-centered training environment, the coach tries to use fewer instructions and allows athletes to problem solve and take responsibility for their own learning, by focusing on game-based activities. This method of coaching is informed by the Game Sense pedagogy (Pill, 2014) and often involves constraints-led practice (Passos et al., 2008). It moves
away from a practice session dominated by drills that don’t involve decision making and instead provides players with activities that replicate the demands of the game, and provide opportunities for developing decision making skills. While numerous sporting organisations now promote an athlete-centered approach (e.g. the FFA National Curriculum), there is little evidence of whether coaches are implementing this philosophy and creating training environments that provide opportunities for players to enhance tactical and technical awareness and skills. Therefore the aim of this presentation is to examine the coaching behaviours and practice activities of coaches from various football codes (soccer, rugby league, rugby union and Australian rules football) at both the youth and professional (senior) level.

**S20.2**

**Usage of futsal balls enhances the quality of play in school football tuition**

*Christopher Heim, U Frick*

*Goethe-University Frankfurt, Institute of Sports Science, Frankfurt, Germany*

Despite being one of the most popular sports in the world, football is also one of the most difficult games to teach in physical education. In school football is normally taught indoors, resulting in the ball bouncing a lot more than it does on a grass field and thus making it more difficult to control the ball, particularly for beginners. However, ball control is essential for any further actions such as passing, dribbling or shooting. The study’s objective was therefore to evaluate the effects of utilizing low-bouncing futsal balls during physical education lessons in comparison to leather and indoor (felt) footballs. Technical skills and playing performance of 423 5th-grade pupils (197 female, mean age 10 years 11.5 months) were assessed in isolated trials (time taken to perform a certain task) as well as during standardized playing situations (quantitative video analysis). Results indicate that utilizing futsal balls is associated with improvements in almost all areas of assessment. In particular, control of bouncing balls is significantly faster with futsal balls than with either leather or felt footballs. In play, using a futsal ball results not only in an increase in the number of ball-contacts for each player but also in an improvement in the quality of offensive play (percentage of “good” passes). In conjunction, these findings indicate that the quality of play can be greatly enhanced by using a futsal ball instead of a leather or felt football when playing or teaching football indoors with young people.

**S20.3**

**The construction of action knowledge and learning competences in football, a didactic model of the game action competences**

*Elkin Arias(1), WG Valencia(1), H Marín(1), A Arias(2)*

*(1) University of Antioquia, Institute of Physical Education, Medellín, Colombia*  
*(2) Dynamo 2014 Football Club*  

The present work was aimed to design a new didactic model to teach football, which is based on constructivism. The goal of the Didactic Model of the Action Games Competences (DMGAC) is an implicit learning of game skills and knowledge construction through manipulated game actions and problematic game tasks to solve. The focus is on the learning of the games principles. 36 young
football players (8-10 years old) were randomized to participate in a 16-sessions football training program whether in a DMGAC learning group or in a Direct Instruction (DI) group. The DMGAC consisted of five didactic strategies: small side games, a question method, focalized games, 1vs1 exercises and guidelines for deliberated practice of technical skills. DI consisted of repetitive practice of technical skills and explicit instructions about games principles. A validated observation test was used as a pre-, post- and retention-test to assess the learning of the game principles. The Wilcoxon test with Bonferroni correction indicated significant differences between pre-test, and post-test of the DMGAC (t = -2.31, k <.05) and between groups in the posttest (t = -2.08, k<.05) and retention-test (t = -2.02, k< .05) in favor of the DMGAC group. The Didactic Model of the Game Action Competences could be considered as an alternative model to the Direct Instructions model. Coaches could implement it to teach football in competitive settings outside school, such as football clubs. More studies on this new model are needed.

S20.4
A new didactics for cultivating creative football players

Ludvig JT Rasmussen, LD Østergaard
Aalborg University, Department of Health Science and Technology, Aalborg, Denmark

Creativity is essential for match performance, as it entails rare and flexible actions that surprise opponents and create favourable game situations. Unfortunately, organized sport participation seemingly impede creativity. This is possibly due to prescriptive approaches, repetitive training, monitoring and evaluation, which are conflicting academic advice on cultivating creativity. Thus, the objective was to investigate how a new didactics, adapted from The Creative Platform (TCP), stimulates players' creativity. TCP encompass creativity-enhancing principles that were modified to football and applied during 3 training sessions of a youth team (15 boys, 13-14 years), by executing several <10-minute creativity-exercises, where player-dyads e.g. collaborated on solving a novel task in many ways whilst receiving movement-inducing cues. Qualitative data for an interpretative phenomenological analysis of the players' creativity were collected by video-observation, player journals, a player focus group, and a semi-structured interview with the coach.

Results revealed that the criteria of The Componential Theory of Creativity were met by stimulating domain-relevant skills (performed numerous technical skills randomly), creativity-relevant abilities (e.g. not fear making mistakes; say 'YES' to all ideas), task-motivation (perceived satisfaction of the basic psychological needs; autonomy, relatedness and competence), and the social environment (felt safe and playful). Moreover, the players had the nerve to engage in atypical activities (i.e. performing novel, difficult, and/or playful skills). Interestingly, some players used these abilities in matches and displayed increased creative self-efficacy.

In conclusion, an appropriate application of the TCP principles creates a safe, playful and motivating environment where players can develop creative abilities, transferable to matches.

S20.5
Weaker, one strong' - pedagogical considerations of developing an elite players non dominant foot through a game centred approach

Michael Ayres, S Page
The study sought to understand the pedagogical challenges and dilemmas experienced by coaches in an elite academy football setting when attempting to develop player’s non-dominant foot using a game centred approach (GCA). A key criteria in the development of an elite player is that they become efficient at using both sides when demonstrating key technical attributes. In order to achieve this goal technical practices are often coached out of context and isolated from the specific environment where they are required to be utilised. The coaches in this study were initially asked to design a game based on the pedagogical principals of a GCA with a specific focus on developing the player’s non-dominant foot. The game was played for two sessions a week for a minimum duration of fifteen minutes per game. This activity was integrated into the regular academy-coaching programme over the duration of three months. Coaches were asked to complete reflective diaries at the end of each week. In addition, three rounds of semi-structured interviews were conducted with the coaches at the beginning, middle and end of the study. Such a change in approach to developing the technique of a player through a GCA significantly challenged the coaches’ conceptual, pedagogical and cultural knowledge and understanding of coaching throughout the duration of the study. The study concluded that when coaches attempt to develop elite players non-dominant foot, through a GCA, they require support and education around the pedagogical, conceptual and cultural challenges and dilemmas that are presented before them.

15:45 - 17:15

S21 ORGANIZATION, ECONOMICS AND POLITICS - PART II

S21.1 Development and voluntarism in football clubs
Siegfried Nagel
Institute of Sport Science, University of Bern, Bern, Switzerland

Volunteers are still the most important resource for amateur football clubs. However, stable voluntary engagement can no longer be granted. This difficulty is confirmed by existing research across various European countries. From a club management point of view, a detailed understanding of how to attract volunteers and retain them is becoming a high priority. The purpose of this study is (1) to analyse the influence of individual characteristics and corresponding organisational conditions on volunteering and (2) to examine the decision-making processes in relation to implement effective strategies for recruiting volunteers. To answer these questions, the current state of research is summarised and then a multi-level-framework is developed which is based on the structural-individualistic social theory. The individual and context factors for volunteering are estimated in different multi-level models based on a sample of n=1,434 sport club members from 36 sport clubs in Switzerland. Results indicate that volunteering is not just an outcome of individual characteristics such as lower workloads, higher income, children belonging to the sport club, longer club membership, or a strong commitment to the club. It is also influenced by club-specific structural conditions. Concerning decision-making processes an in-depth analysis of recruitment practices for volunteers was conducted in selected clubs (case study design). based
on the garbage can model. The results show that systematically designed decision-making processes with a clear regulation of responsibilities seem to solve personnel problems more purposefully and more quickly. Based on the findings some recommendations for volunteer management in football clubs are worked out.

S21.2
Learning capacities of voluntary sport clubs in relation to external advisory

Benjamin Egli, C Klenk, T Schlesinger, S Nagel

University of Bern, Institute of Sport Science, Bern, Switzerland

Volunteer research in sports clubs has paid little attention to the learning processes in sports clubs even though organizational change represents a major management challenge. Developing a clear understanding of restrictions as well as promoting factors associated with organizational learning in sports clubs is crucial for developing sustainable management concepts — particularly ones that can be applied by sport policy makers, or sports associations. To bridge this gap, our study uses explorative case studies in order to analyse the learning capabilities of sports clubs in relation to external advisory: Which organizational factors can promote or detain learning processes in sports clubs? The learning processes in the sports clubs were analysed in relation to an advisory programme of the Swiss Football Association (SFA). Before, during and after the programme, questionnaires and guided interviews were conducted with the project teams of the eleven participating football clubs to assess different learning processes. The findings indicate that learning processes in football clubs occur differently and both promoting and restrictive factors can be identified. Five promoting factors sustain the learning processes and lead to sustainable change: Internal support, an engaged project team, active communication, adaption of the external inputs and effective internal working processes. In contrary, five detaining factors can slow down or prevent change in the football clubs: No internal support, an uninvolved project team, unattended communication, low processing capacity and a lack of resources. Furthermore, it reveals that restrictors can also be a functional asset in order to handle existing problems successfully.

S21.3
The Director of Football: challenges to the prototypical model of management within the English Premier League

Ian Lawrence

Leeds Beckett University, Carnegie School of Sport, Leeds, UK

for many years economists have recognised the importance of the manager in the production process, but rarely have they looked at how this translates to the context of elite team sports. In this paper I consider the emerging prototypical role of ‘Director of Football’ (DoF) and the challenges this presents to historical and traditional perceptions of the football manager. It is the contention of this paper that the effectiveness of the traditional managerial model is compromised by the divergent range of skills that modern day managers require. As such a prototypical model of football management needs to be considered within which the DoF is integral. This paper concludes
that the DoF provides an effective mechanism of support within a transparent and efficient hierarchical delegation of responsibilities.

S21.4
Organizational culture change in amateur football clubs - a critical reflection
Magnus Forslund
Linnaeus University, School of Business and Economics, Vaxjo, Sweden

In the general field of Organization Studies, organizational culture is regarded as a critical aspect of understanding success and failure of organizational change. So far however, in the field of amateur football clubs this topic has not been studied extensively. To what extent established theories on organizational culture change is relevant in such a setting or not remains unclear. This paper reports from a ten year long ethnographic study in which the author during the first five years was involved in various functions in the club. The paper describes how club management during these five years attempted a number changes. These changes are interpreted from several perspectives highlighting the ambiguity of organizational change processes. Partly the study seems to confirm previous studies highlighting the perpetual forces of organizational culture. It also however shows that certain changes are possible. By performing a re-interpretation based upon these two observations we could raise questions on what organizational culture in an amateur football club actually is and possible implications for managing such a club. The very contribution of the paper thus is the reflections regarding how to understand organizational culture change in amateur football clubs.

S21.5
“Football fitness has changed the club from an absolutely laddish atmosphere to a respectably place”
Søren Bennike, L Ottesen
University of Copenhagen, Department of Nutrition, Exercise And Sports, Copenhagen, Denmark

The voluntary based and heavily state funded sports system is challenged by societal changes, placing new demands for voluntary sports clubs. Among others things this becomes very obvious in a time where sport policy-makers increasingly recognize the value of advocating sport as a means of enhancing the overall health of the population. The role of sport for enhancing health has progressed from a passive and symbolic approach to one that is more explicit, ambitious and organized. In Denmark the Football Association has launched a concept called Football-Fitness, which is a football-based concept for health rethinking the organization of football. Approx. 200 voluntary football clubs has stated their interest and is managing the concept on a local level. In a theoretical perspective of institutionalism the clubs can be identified as existing of three systems - regulative, normative and cultural-cognitive pillars. The aim of this paper is to explore how the concept of Football-Fitness will affect the normative dimension. A questionnaire survey dated 2013 detected a number of changes, rated almost solely positive by the respondents. The only factor which in some clubs is negatively affected is the workload of the volunteers. Field work, including interviews has been conducted in 5 clubs, to further explore these changes. A chairman in a club
where the target group of Football Fitness is women states: “It creates a new behavior. The male chauvinistic atmosphere, which me myself is a part of has heavily calmed down - all for the better”.
W04
Training and performance characteristics of professional Australian Football
Aaron Coutts(1,2)
(1) Sydney University of Technology, Faculty of Health, Sport & Exercise Discipline Group, Lindfield, Australia
(2) Carlton Football Club, Melbourne, Australia

Australian Football (AF) is a demanding sport that requires players to complete prolonged, high intensity, intermittent activity that is punctuated by many intense collisions and skill activities. As a consequence of these high activity demands, professional AF players require many well-developed physical capacities. Whilst it has been more than 50 years since the first report on match and training analysis of AF players, it has only been recently that new microtechnologies and match notational analysis systems have been able to provide sufficient datasets that can provide meaningful insights into the physical and technical requirements of training and match-play. In addition, recent work in developing multi-dimensional player monitoring systems have provided an improved understanding of how players have responded to the stressors of training and match-play. When these data are integrated, they provide important information that provide scientists and coaches with a deeper understanding of optimal training processes and the factors that underpin performance. Accordingly, this presentation will examine recent research that has examined 1) the training and periodisation characteristics of professional AF players, 2) the complex interplay of factors affecting match-running performance in AF (i.e. schedule, fitness, match score, time of season, skill performance etc.), and 3) the relationships between match activity profile and football performance in professional players. Practical recommendations for integrating physical activity and player monitoring data will be provided, with specific focus on training periodisation, performance analysis and athlete management will be provided.

W05
Fitness coaching in an elite football team - with special focus on individual-based approach
Marcello Iaia
University of Milan, Department of Biomedical Science for Health, Milano, Italy

Maintaining the optimal fitness and health status of the elite player is crucial in sustaining high levels of performance throughout the season. This requires careful management and thorough attention to a number of key indicators that impact upon the players' individual training, recovery...
and injury prevention strategies. From a 'fitness’ perspective, the focus of field-based training is to induce the appropriate stressors to ensure the energy systems of players adapt and are best equipped to withstand the competitive demands of the game. Thus, the comprehension of the specific metabolic and mechanical demands that a player experiences during the most intense phases of the game it's pivotal for maximizing the subsequent creation and delivery of individualized training programmes. The approach is therefore to trigger the specific physiological systems, understood to be limiting factors to performance, rather than perform holistic training whereby many mechanisms are taxed to lesser degrees within the same drill. Using specific methods to prepare elite players for match-play requires a higher complexity in the quantification of the workload. Consequently, knowledge of a wide variety of physical indexes is warranted for accurate workload analyses and detailed movement activity assessments during football practices. An in-depth information about the training parameters taxed with certain drills enables a better understanding of the physiological objectives to target in order to stimulate the physical components of match performance. In conclusion, many factors need to be considered when designing a training programme for the elite soccer player. During field based conditioning, it is paramount that training load is fully understood and is appropriate for the intended physiological and performance adaptations. The evaluation of current practice should encompass relevant experiences together with the rigor of applied research.

09:00 - 10:15
S22 INJURY PREVENTION

S22.1 Prevention of hip and groin injuries in football
Per Hölmich
Sports Orthopedic Research Center-Copenhagen, Arthroscopic Center Amager, Amager/Hvidovre Hospital, Copenhagen, Denmark

A pre-participation examination may help to identify established risk factors (previous groin injury, age, sport experience, sport specificity, pre-season sport specific training, hip ROM, hip muscle strength and abdominal muscle recruitment). Development of a sport-specific prevention strategy to reduce the risk of groin injury in sport should include components of adequate rehabilitation for previous injury, early identification of sport-specific ROM and strength deficits, and achieving sport specific ROM and strength. Additionally, pre-season sport-specific training may allow for further contraction and function-specific recruitment of these muscles which might allow for their more effective utilization and less onset of fatigue as the season progresses. Adequate pre-season and continued through season assessment and training hip muscle strength/muscle balance and torso muscle recruitment timing may further minimize groin injuries.
S22.3

Hamstring injury prevention in soccer: before or after training?
Ric Lovell, J Siegler, P Marshall
University of Western Sydney, School of Science and Health, Penrith, NSW, Australia

Purpose: To examine the effects of performing a 12-week program of Nordic hamstring exercises (NHE) before or after soccer training upon eccentric hamstring strength, motor-unit activation, and muscle architectural responses.

Methods: Amateur soccer players were randomized into 3 training groups. The control group (CON; n=10) undertook core stability exercises, whereas a periodized NHE program was delivered either during the warm-up (PRE; n=11) or cool-down (POST; n=10) of bi-weekly training sessions. Outcome measures included peak torque and concomitant peak surface electromyography signals (sEMG) of the hamstring muscles during knee flexor maximal eccentric contractions, performed at 30°·s⁻¹. Ultrasonography was used to determine muscle thickness and muscle fiber pennation angle.

Results: Performing the NHE derived likely small peak torque increases in both PRE (+12.5%; 90% confidence intervals [CI]: 2.8 to 23.1%) and POST groups (+8.2; CI: -2.2 to 19.8%), relative to CON. There were also likely small increases in muscle thickness (PRE: +6.0% [CI: 0.7 to 11.5%]; POST: 5.7% [CI: 2.6 to 8.8%), and most-likely moderate increases pennation angle (PRE: +23.3% [CI: 15.6 to 31.5%]; POST: 17.5% [CI: 9.5 to 26.1%] in the PRE and POST groups versus CON. Between-group differences in sEMG changes were unclear. Only pennation angle was different between treatment groups, with a likely greater (small) increase in PRE versus POST (+4.8; CI: -0.1 to 9.3%).

Conclusion: A 12-week eccentric hamstring-strengthening program increased strength and induced a hypertrophic response in amateur soccer players, but there was no further enhancement in the adaptive responses by training in a 'fatigued' state.

09:00 - 10:15

S23 A MULTI-DISCIPLINARY EXAMINATION OF FOOTBALL DEVELOPMENT AND PERFORMANCE

S23.1

A multi-disciplinary examination of football development and performance: a perceptual-cognitive perspective
Itay Basevitch(1), C Rossato(1), K van Paridon(1), G Tenenbaum(2), E Filho(3), P Ward(4)
(1) Anglia Ruskin University, Sport and Exercise Sciences Research Group, Cambridge, UK
(2) Florida State University, USA
(3) University of Chieti-Pescara, Italy
(4) University of Huddersfield, UK

In football there are various objective methods for measuring and tracking development of specific physical (e.g., speed) and motor skills (e.g., shooting). However, there are no objective tools to measure football specific perceptual-cognitive skills (e.g., anticipation). Thus, the primary objective
of the study was to examine the perceptual-cognitive skills (i.e., anticipation and option generation processes) of low and high skill, male and female football players using a video-based task environment. Players were shown action clips of developing football plays that were stopped at three temporal points (i.e., 400ms, 200ms and 0ms) prior to an action and when the last frame was frozen or occluded. Using an answer sheer, players were required to anticipate the action and generate and prioritize the plausible options. High-skill players scored better on the anticipation and option generation tasks throughout the conditions. In addition, task conditions affected high and low-skill players differently. Gender differences were also observed. Male players anticipated actions more accurately, generated more plausible options, and prioritized them more efficiently, than females. Findings provided insights into the mechanisms underlying option generation and anticipation processes in football. Furthermore, the findings suggest that it is possible to capture perceptual-cognitive skills in soccer.

S23.2
A multi-disciplinary examination of football development and performance: a physiological monitoring perspective

Dan Gordon, J Baker, A Scruton
Anglia Ruskin University, Sport and Exercise Sciences Research Group, Cambridge, UK

Football is a multi-factorial sport comprising a multitude of physiologically orientated fitness components. There is a plethora of both field and laboratory tests which are suggested to be both valid and reliable in the context of monitoring player development, yet many of these are unobtainable to players and teams who compete in the lower leagues of the sport. Therefore the purpose of this intervention was to explore how a battery of fitness orientated tests could be used to monitor player development during the pre-season period for a semi-professional soccer team. Players (n=15) were assessed prior to and upon completion of the pre-season period across a variety of fitness-based tests: Maximal oxygen uptake (VO2max), haematology, body composition, agility, lower limb flexibility, sprint speed, reactive strength index, lower limb power and lung function. Data were presented both as pooled, individual and position specific, based on Z-score distributions. The data indicated that during this 8-week pre-season period that there were significant increases in left and right foot turning agility coupled with an increased response to the tapping test. Further enhancements were also seen for onset of ventilatory threshold. However there were significant decreases in areas such as RSI and sprint speed. The findings and approach taken to presenting the data provided a powerful insight to both the players and coaching staff as to the physical condition of the team and suggest that more time needed to be devoted to the development of speed and neurological development during this preparatory training period.

S23.3
A multi-disciplinary examination of football development and performance: a social-gender perspective

Katrina McDonald, N Collins, E Hope, K Whitehead
Anglia Ruskin University, Department of Life Sciences, Cambridge, UK

Football is the largest female team sport in the UK (The Football Association, 2014). Although a vast number of youth female players participate up to the age of 16 or 18, a large number of females decide not to make the transition from youth football to adult women’s football. This investigation examines a case study of a particular region in the UK Football Association, in which there is an evident high attrition rate when it comes to making the transition from youth to women’s football. The main rationale for this project was to find out, (a) why females who are currently competing within the under 16 and under 18 girl’s leagues play football, (b) what keeps them playing football and, (c) if they are not transitioning to women’s football, why and what are the barriers? The findings were based on specially designed electronic questionnaires and follow-up semi-structured interviews. The results have implications on how the Football Association will try to combat attrition and reduce the barriers preventing girls from transitioning to play in the women’s league.

Keywords: football, girls, women’s, barriers, attrition

S23.4

A multi-disciplinary examination of football development and performance: a psychophysiological perspective

Kjell van Paridon(1), I Basevitch(1), M Bristow(1), C Campbell(2)
(1) Anglia Ruskin University, Department of Life Sciences, Cambridge, UK
(2) St Mary’s University Twickenham, London, UK

Participating in sport competition is associated with the evaluation of your performance and athletic status. The anticipation to this evaluation leads to an increase in anxiety and stress hormones which prepares the athlete for competing. However, it is less well known to what extend the hormonal stress response is stable over consecutive games and how it relates to performance. Thus, the aim was to assess cortisol and performance in consecutive football games. Salivary cortisol and performance of semi-professional football players (N=14) was assessed in 8 consecutive home games. Saliva was collected 10 minutes before the start of each game (15.00pm) and on a rest day. An individual video of each player’s ball handling in the first 15 minutes of the game was rated by a UEFA-B football coach. Due to non-playing, transfers and injuries 54 player-game saliva samples were collected and analysed for cortisol concentration. There was a significant increase in the cortisol concentration from rest (0.17±0.090 µg/dl) to competition (0.18±0.089 µg/dl) with an effect size of 0.52. A trend for an increased cortisol concentrations in games against opponents high in the league table compared to lower ranked teams was identified. The performance of the players was not different in between games and no relationship was found between cortisol concentration and performance. These results confirm that salivary cortisol is significantly increased before a competition. However, the cortisol response tends to be stable indicating that players don’t experience changes in hormonal stress when competing against different quality opponents within a league.

09:00 - 10:15
S24.1  Women’s football: the game and its fans  
Gertrud Pfister  
NEXS, University of Copenhagen, Department of Human and Social Sciences, Copenhagen, Denmark  

Women began to play football already in the beginning of the 20th century, but only in the 1970s was women's football accepted by the football federations. Since then women's teams emerged in many countries, although female players were more often tolerated than appreciated. In 1996, women's football became an Olympic sport and experienced a worldwide expansion and a growing appreciation. In this contribution, the focus is on the numbers and the status of women's football in six European countries. The information is based on reports and membership statistics of football federations and the results of a representative survey. The results show large differences between men's and women's football with regard to appreciation and support. However, there are also huge differences with regard to the football enthusiasm in the different countries. The results will be interpreted and discussed on the backdrop of various gender and fan theories.

S24.3  Motivations and expectations of sports spectators scale: new tools for identifying soccer spectators’ motivations  
Florian Escoubes  
University of Toulouse 1 Capitole, School of Management, Toulouse, France  

Attracting new sport spectators in stadiums is today one of the main objectives of European football clubs. Discerning sports fans' motives is one of the ways clubs can achieve this. Therefore, this article aims to develop an efficient measurement scale for consumer motives and suggests a classification or a typology of sports fans. The study investigates soccer fans' motivations in France. We, therefore, use and reinterpret scales of earlier studies. Moreover, we conduct 5 focus groups in order to suggest new items. We propose the Motivations and Expectations of Sports Spectators (MESS) Scale that contains 24 motivation items (5 point Likert) potentially leading people to go to the stadium. The questionnaire is distributed to football spectators and general population (N = 1352). Exploratory and Confirmatory factor analysis allows us to identify eight different and unique factors, representing eight different motives of sport fans: 1) Ambiance and fan support; 2) Stadium installation; 3) Football aesthetic; 4) Relaxation; 5) Social interaction; 6) Opportunism; 7) Uncertainty of game; 8) Emotion. Based on these eight components and effective attendee behavior, we conduct a dynamic cluster analysis that allows us to identify 5 profiles of sport spectators: Devoted Fan, Show Seeker, Occasional spectator relaxation, Occasional spectator interactive, Disinterested opportunist. Finally, our typology allows to differentiate football spectators and may be used by sport marketers to change club strategy and attract new audiences to in their stadiums.
Passions and Colors of Bare fans, social meanings of acting of cheering for a professional soccer team in Manaus

Alexandre Marco Araújo Chaves(1,2), A de Araújo Soares(2,3)
(1) Faculty of La Salle, Federal University of Amazona, Department of Physical Education, Manus, Brazil
(2) Federal University of Amazonas, Manus, Brazil
(3) Faculty of Physical Education and Physiotherapy, Federal University of Amazonas, Brazil, Manus, Brazil

This study presents a discussion of symbolic meanings present in local practices cheerleaders. The research objective was to investigate the social meanings of twist for a professional football team in Manaus. To carry out our research we assume that the initial twist is seemingly simple, seen through the prism of references and identity standards of the population, however, immersed in this apparent simplicity, and in addition to the sports events are present dynamics of intense relations passion, social and cultural meanings ample, where their signs bring with them a symbolic universe that say a lot about the Brazilian society and Manauense so particular. Our research was characterized as an ethnographic study and data collection were used as instruments, questionnaires, semi-structured interviews and a field journal. To decode the discourse of the interviewees and extract from them the essence of the phenomenon, we used discourse analysis. Besides the organized fans were also part of this research the ordinary fans, in order to ascertain their perceptions of the meanings of the twist and these differed from the perception of organized supporters, as well as to know which teams of your choice. The study revealed that the twist to manauenses football fans, who mostly twist primarily by professional clubs of the State of Rio de Janeiro, plays an important role in the social life of the same forms of socialization and identification symbolically present and for its ability to generate exciting and thrilling moments, within a highly regulated and standardized daily.
Physiological responses and consequences of playing in the heat

Lars Nybo
University of Copenhagen, Department of Nutrition, Exercise and Sports, Copenhagen, Denmark

Endogenous heat production is markedly increased during exercise and when conducted in adverse environmental settings the additional physiological strain may exacerbate the development of fatigue as hyperthermia provokes both cardiovascular and cerebral changes of importance for performance. Soccer is played world-wide and consequently competitive matches are commonly conducted in hot environments and during such conditions players become hyperthermic during the game with core and muscle temperatures around 40 and 41 ºC, respectively. Compared to cool conditions this is associated with a reduction in total match distance and marked lowering of high intensity running. In contrast, peak sprint speed is increased and technical parameters evaluated as passing success are not negatively affected in the heat. In relation to recovery it is characteristic that soccer matches are associated with muscle damage and consequently a delayed recovery response of muscle glycogen and functional performance. However, neither indices of muscle damage nor the recovery of sprint or intermittent endurance performance are aggravated following match play in the heat. These observations apply for acclimatized trained subjects and it is of utmost important to train and adapt properly prior to matches and tournaments in the heat as acclimatization markedly improves the ability to tolerate environmental heat stress. Taking the time course of cardiovascular and sudomotor adaptations to exercise in hot environmental conditions into account and considering the physiological parameters of importance for match play at least one week of acclimatization is recommended before matches or tournaments in the heat.

No additional benefit of repeat-sprint training in hypoxia than in normoxia on sea-level repeat-sprint ability

Paul Goods(1), B Dawson(1), G Landers(1), C Gore(2,3), P Peeling(1)

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(2) Australian Institute of Sport, Canberra, Australia
(3) Flinders University, Adelaide, SA, Australia

To assess the impact of ‘top-up’ normoxic or hypoxic repeat-sprint training on sea-level repeat-sprint ability, thirty team sport athletes were split into three groups, matched for running repeat-sprint ability (RSA), cycling RSA and 20 m shuttle run performance. Two groups then performed 15 maximal cycling repeat-sprint training sessions over 5 weeks, in either normoxia (NORM) or hypoxia (HYP), while a third group acted as a control (CON). In the post-training cycling RSA test, NORM improved mean power output in set 2 (p=0.04), and peak power output in sets 2 (p=0.05) and 3 (p=0.04) compared to CON, with no other differences between groups. Both NORM and
HYP improved mean power output for every set compared with baseline (p<0.05), whereas CON did not change. Running RSA, demonstrated no between group differences. Mean sprint times improved significantly from pre- to post-training in sets 2, 3 and overall for CON and NORM, while HYP demonstrated improved mean sprint times in every set (p<0.05). There were no between group differences in shuttle run performance. In conclusion, cycling repeat-sprint ‘top-up’ training improved cycling RSA, and to a lesser degree, running RSA; however, there was no additional benefit of ‘top-up’ training in hypoxia than in normoxia.

**S25.3**
Running performance during WC 2014 under different climatic conditions
Markus Tschopp(1,2), D Baumgartner(2)
(1) Swiss Federal Institute of Sport, Magglingen, Switzerland
(2) Swiss Football Federation, Switzerland

The aim of the study was to analyze how running performance in the Soccer World Cup Brazil 2014 was influenced by the different climatic zones and by game performance. All data analyzed were published on www.fifa.com. Running performance of all 96 games during the group stage were measured with a video-based tracking system (SportVU, STATS, USA). The effects of climate conditions and game outcome (game result, qualification for final round) on running performance were analyzed. Matches were divided into 3 groups, with 4 locations each, according to geographical latitude of the match location: North (0-10.0°), Middle (10.1-20.0°), South (>20.0°). Humidex for every game was calculated from temperature and relative humidity. Mean Humidex was significantly different between the 3 locations (North: 36.9±1.6°, Middle: 31.1±4.0°, South: 23.7±6.6°). During matches in the north, players performed a significantly smaller number of sprints than in the middle (-8.6%) and the south (-11.0%), less high intensity (> 14.0 km/h) distance (-7.9%, -10.9%), and less total distance (-3.4%, -3.9%). There was no difference in running performance between more and less successful teams. Running performance, especially high intensity running and sprinting, were markedly reduced during games in the northern part of Brazil, where hot and humid conditions existed during the Soccer World Cup 2014, independently from general game performance.

**S25.4**
Reduced team sport performance up to four days following long-haul transmeridian air travel
Peter Fowler(1), R Duffield(2), S Crowcroft(2), A Mendham(2), S Halson(3), J Vaile(3), W Knez(1)
(1) Aspetar Orthopaedic and Sports Medicine Hospital, Doha, Qatar
(2) Sport & Exercise Discipline Group, University of Technology Sydney, Sydney, NSW, Australia
(3) Performance Recovery, Australian Institute of Sport, Canberra, ACT, Australia

Though international travel is a common requirement for elite team sport athletes, limited information is available on the recovery timeline for team sport performance following travel. Consequently, the present study aimed to determine the effects of long-haul transmeridian air travel on physical performance relevant to team sports. Data was collected from 19 physically active males at 09:00 (AM) and 17:00 (PM) for 4 days prior to (Baseline) and following (Post 1-4) 20 h
eastward air travel across 8 time-zones. Specifically, participants performed a countermovement jump (CMJ), 20-m sprint and agility tests (T-Test), followed by the Yo-Yo Intermittent Recovery level 1 (YYIR1) test. Analyses were performed by fitting a linear mixed model to the absolute change from baseline. CMJ mean power and force were significantly reduced at Post 1 PM, Post 2 and 3 AM and PM, and Post 4 AM (P<0.05; d>0.90). 5-, 10- and 20-m sprint times were significantly slower at Post 1, 2 and 3 PM (P<0.05; d>0.90), and agility times were significantly slower at Post 1 PM (P=0.01; d=1.62). Lastly, at Post 1 and 3 PM, distance covered in the YYIR1 was significantly reduced (P<0.05; d>0.90), whilst large effect sizes indicated reduced YYIR1 performance at Post 2 PM (P=0.09; d=1.11). Results from the present study suggest team sport physical performance may be reduced up to 4 days following eastward long-haul transmeridian air travel. This has implications for the timing of arrival prior to competition and training prescription in the days following long-haul flights in team sport athletes.

10:30 - 11:45
S26 TRAINING - PART III

S26.1 Eccentric training as treatment of muscle-tendon injury
Per Aagaard(1,2)
Institute of Sports Science and Clinical Biomchanics, University of Southern Denmark, Odense, Denmark
(2) Institute of Sports Medicine Copenhagen (ISMC), Bispebjerg Hospital, Copenhagen, Denmark

During the last decade still more evidence has accumulated to suggest that resistance training can be effectively used to prevent and rehabilitate overuse injury in human muscle and tendon tissue. In particular, exercise with emphasis on eccentric (ECC) muscle contractions seems to prove useful for the rehabilitation and prevention of chronic muscle strain disorders and various tendinopathy conditions. Recent findings have suggested that slow-type heavy-resistance strength training (HRST) may have similar beneficial effects. The use of ECC loading modalities as well as the inclusion of decline board training appear to result in elevated tendon forces and increased magnitudes of tendon strain compared to control conditions. Analysis at the tendon level indicates that type I collagen production is increased following ECC training, reflecting that accelerated tissue remodelling takes place. Recent data have demonstrated that heavy and ultra-slow resistance training may elicit superior long-term rehabilitation results in athletes with long-term Jumpers Knee injury compared to corticosteroid treatment or ECC decline board training. In terms of rehabilitation/prevention of muscle overuse injury, resistance exercise intervention using ECC muscle overloading appears to be highly effective to rehabilitate and prevent muscle strain injury in athletes even in conditions of chronic recurrent injury, as consistently demonstrated in elite football players, sprinters and martial arts fighters. In addition, ECC hamstring training in elite football players resulted in improved functional running capacity reflected by enhanced 30-m sprint performance. The adaptive mechanisms elicited by ECC training and slow-type HRST may involve elevated type I collagen synthesis and an enhanced anabolic stimulus for myofibrillar protein synthesis, i.e. facilitating remodelling processes in tendon and muscle. This could include elevated
paracrine and autocrine IGF-1 signalling, serial sarcomere addition, enhanced capacity for cytoskeletal force transmission, and stimulation of fibroblasts located in tendon tissue and the extracellular matrix.

S26.2
Peak power sprinting: a new training approach for sprinting ability in soccer
Carlo Zanetti
University of Pavia, Department of Public Health, Experimental & Forensic Medicine, Pavia, Italy

Aim: The purpose of this study is to propose a new training approach to increase the sprinting speed in young adult footballers using the Power Sprint device. Power Sprint is a training machine that allows the subject to work counter elastic resistance during sprinting.

Method: The study involved two groups of young adult players. The experimental group consists of 6 subjects, the control group consists of 5 subjects. Before administration of the two training protocols (Power Sprint training and traditional training by jumps and sprint repetitions performed during a 6 weeks in-season period), the experimental group was subjected to a test with Power Sprint to determine the individual peak power and one control test: a sprinting test with two changes of direction of 90° on 15 meters. The control group performed only the sprinting test.

Results: The experimental group was trained using the Power Sprint device while the control group performed a traditional training to enhance the sprinting ability. Our data show how Power Sprint training improves the speed in the sprinting test on 15 meters with two changes of direction of 90° (p=0.03) while with traditional training does not have any improvement (p=0.82).

Conclusion: Our findings indicate how Power Sprint training significantly improves the running speed on traits with the presence of changes of direction without the ball. Power Sprint could be used to increase the sprinting speed in short distances with changes of direction in young adult footballers.

S26.3
The effects of different seasonal strength training protocols on androgen levels and neuromuscular exercise performance in professional soccer players
Nikolaos Koundourakis(1,2), N Androulakis(2,3), M Venihaki(1), E Castanas(4), N Malliaraki(4), A Margioris(4)
(1) Department of Clinical Chemistry, School of Medicine, University of Crete, Greece
(2) Ergotelis FC Medical Team, Iraklion Crete, Greece
(3) Department of Laboratory Haematology, Iraklion University Hospital, Crete, Greece
(4) Laboratory of Experimental Endocrinology, University of Crete, School of Medicine, Crete, Greece

Objectives: To examine the effects of two seasonal training programs, different in strength volume, on androgen levels and neuromuscular performance parameters in soccer players.

Methods: Forty-five elite professional soccer players participated in this study. Players of Team-A (n=23) followed a high-volume strength seasonal training program (3 sessions/week, consisting of one general and two soccer specific strength sessions), whereas Team B (n=22) implemented a
moderate-volume strength training program (2 sessions/week, consisting of one general strength and one specific strength session). Total-testosterone (TT), free-testosterone (FT), 3a-androstenediol-glucuronade (3a-Diol-G) levels, as well as, sprinting performance (10m sprint) and jumping ability [squad-jump (SJ), and countermovement-jump (CMJ)], were measured at the beginning and at the end of the experimental period.

Results: No differences were observed at baseline for the examined parameters between the two teams (p>0.05). Analysis revealed that in Team-A TT (p=0.002), FT (p=0.025) and 3a-Diol-G levels (p=0.001) increased significantly at the end of the study compared to baseline, while in Team-B there was evident only a weak significant increase in ÔÔ (p=0.038) levels. All exercise performance parameters increased significantly in both teams (all p<0.001) however these alterations were more pronounced in Team-Á vs Team-B regarding SJ, CMJ, and 10m sprint (16.8%, 16% and 12% improvement in Team A compared to 8.8%, 7.5% and 6% in Team-B respectively).

Conclusions: Our findings suggest that the higher volume of strength training combined with soccer training caused an elevation of circulating TT, FT, and 3a-Diol-G levels in parallel to a more pronounced induction of performance capacity.

S26.4

The acute hormonal responses to two concurrent endurance and strength-training programmes in elite soccer players

Kevin Enright(1), JPMorton(2), J Iga(3), B Drust(2)
(1) Liverpool Hope University, Department of Health Sciences, Liverpool, UK
(2) Liverpool John Moores University, School of Sport and Exercise Sciences, Liverpool, UK
(3) The English Football Association, London, UK

Objectives: To compare the hormonal responses to two soccer-specific concurrent-training scenarios.

Method: Thirteen English Premier League football players (age: 16.8 ± 0.6 years; height, 1.80.8 cm ± 7.3 cm; body mass, 73.1 ± 5.7 kg; VO2 max, 64.4 ± 4.81ml-1.kg-1.min-1) participated in this matched group design study. Following familiarisation and 1RM strength testing the participants completed two experimental trails separated by 7 days. Trials involved football-specific endurance training followed by a resistance-training session (E+S) and vice versa (S+E). Throughout each trial venous blood samples were collected at 5 systematic time-points (T1 – T5). Blood samples were retrospectively analysed for testosterone (T), cortisol (C) and growth hormone (GH).

Results: Interaction effects for C (P = 0.02) and GH (P = 0.01) were observed. Post-hoc analysis revealed significant differences T & GH at T3 (T; 27% Δ, P = 0.03; GH; 326% Δ P = 0.05) and C at T4 (C; 33% Δ, P = 0.01). Significant differences in the T : C ratio (48% Δ, P = 0.04) were also observed at T4. The AUC between experimental conditions was significantly higher in the E+S condition for GH (P = 0.04) (E+S; 13.8 ± 10.6*, S+E; 5.5 ± 9.8), and T (P = 0.05) (E+S; 300 ± 76* S+E; 243 ± 81).

Conclusion: The results suggest that the organisation of training can alter acute secretion of hormones which may be related to functional and adaptive processes. The present findings suggest that the 'E+S' condition produced greater relative increases testosterone and growth hormone.
S27.1
Using rugby small-sided games to improve markers of systemic inflammation, mitochondrial biogenesis and glucose tolerance in sedentary populations.

Rob Duffield
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Physical inactivity is associated with the development of chronic diseases, including type 2 diabetes mellitus and cardiovascular disease. The benefits of exercise for chronic disease prevention are associated with improvements in clinical risk factors, i.e., adiposity and lean muscle mass, the chronic inflammatory state and aerobic capacity. Collectively these factors are known to influence glucose regulation and insulin sensitivity, and can represent markers of disease progression. In part, exercise-induced clinical benefits have been attributed to metabolic and mitochondrial remodelling within skeletal muscle. Specifically, following regular exercise an improved systemic inflammatory state may have direct influence on glycaemic control; whilst mitochondrial biogenesis within skeletal muscle is thought to improve both glucose tolerance and inflammatory mechanisms. Consequently, regular exercise is suggested to prevent disease progression by improving the regulation of respective glucose and inflammatory pathways. Football-based small-sided games (SSG) represent a novel method of providing particular communities with an alternate method of physical activity than traditional continuous exercise modes. Regardless of the potential social benefits of SSG’s, the intermittent high-intensity nature is proposed to improve insulin sensitivity, glucose tolerance and the content of proteins associated with mitochondrial biogenesis. Additionally, pro-inflammatory markers are amplified in obese and insulin resistant populations, and given the purported benefit of SSG training to improve aerobic capacity and body composition; such training may have the potential to improve the chronic inflammatory state. Accordingly, the current presentation will outline the acute and training based responses to rugby-specific SSG’s to improve health-based parameters in middle-aged, sedentary but disease free populations.

S27.2
Impact of walking football: effective team strategies for high performance veteran players

Harry Hubball(1), P Reddy(2)
(1) The University of British Columbia, Vancouver, Canada
(2) Aston University, Birmingham, England, UK

The physiological and psycho-social health benefits of recreational walking football for sedentary and unfit veteran players have been recently documented with the growing popularity of this rapidly emerging sport across the UK. Drawing on three key levels of competition, this study examines the impact of walking football and effective team strategies for high performance veteran 5-a-side players. Action research methodology was employed in a series of four 5-aside competitive game trials over a 2-month period with a successful high performance veterans 5-aside/futsal World Cup
winning team from Canada. Data collection sources included team game video recording and performance analysis, focus group interviews with players, coach’s field notes, and pedometer step/distance/calorie monitors. Data suggest that, under certain conditions, walking football can have unique physiological and cognitive team-building benefits for high performance veteran football players. Effective team strategies for walking football included competitive game progressions from 3v3 to 5v5; basic positional team roles; team game-plan strategies to maximize team strengths and guard against team weaknesses; assertive team calling throughout game; full pitch man-to-man close marking; constant off-the-ball mobility during offence; rapid ball passing with a trajectory in close proximity to team mate; and rebound anticipations following defensive and offensive shooting attempts.

S27.3
Common mental disorders among professional footballers in five European countries
Vincent Gouttebarge(1,2), H Aoki(3), G Kerkhoffs(2)
(1) Players’ Services, World Players’ Union (FIFPro), Hoofddorp, The Netherlands
(2) Department of Orthopaedic Surgery, Academic Medical Center, Amsterdam, The Netherlands
(3) St. Marianna University School of Medicine, Kawasaki, Japan

This study aimed to assess the difference between professional footballers from five European countries in relation to the prevalence of symptoms related to common mental disorders. Therefore, cross-sectional analyses were performed on baseline questionnaires from an ongoing prospective cohort study among professional footballers. Outcome measures were symptoms related to common mental disorders (distress, anxiety/depression, sleep disturbance, adverse alcohol behaviour, smoking, adverse nutrition behaviour) assessed through several validated scales. An electronic questionnaire was set-up in English, French and Spanish and distributed among professional footballers by the national players’ unions in Finland, France, Norway, Spain and Sweden. A total of 540 professional footballers were involved in the analyses. Mean age of the participants ranged from 25.0 (Finland) to 28.2 years old (France). Prevalence of symptoms related to common mental disorders reached up to 18% for distress (Sweden), 43% for anxiety/depression (Norway), 33% for sleeping disturbance (Spain), 17% for adverse alcohol behaviour (Finland), 12 % for smoking (France), and to 74% for adverse nutrition behaviour (Norway). Pair-wise Chi-Square tests indicated statistically significant difference between Finland and France (smoking), Finland and Norway (alcohol, nutrition), Finland and Spain (sleeping disturbance), Finland and Sweden (alcohol, smoking), France and Norway (smoking, nutrition), France and Sweden (smoking), Norway and Spain (smoking, nutrition, anxiety/depression), Norway and Sweden (nutrition), and between Spain and Sweden (alcohol, smoking). Results suggest the needs of a multidisciplinary approach applied by the medical team especially to severely injured footballers, being aware of the potential occurrence of symptoms of common mental disorders.
S27.4
Bringing neuroscience into football training: principles of training working memory within football coaching

Joseph Hall, I Culpan, J Clarke
University of Canterbury, School of Sport and Physical Education, Christchurch, New Zealand

Working memory training (WMT) explores how a focus on neurological outcomes could be used to increase decision making performance in football, specifically ‘at action’ decision making occurring within 5 seconds of a stimulus. A focus on neurological outcomes would create advances to game based coaching, where coaches create football-specific problems in order to improve decision making performance. This presentation reports on research investigating the extent to which the integration of WMT into football coaching practice can increase performance. Working memory deals with the manipulation of information and the making of decisions under five seconds. WMT is used to overload working memory to create a supercompensation effect. The literature has shown working memory training to improve reaction time and decision making performance, as well as affecting neurological plasticity. Further qualitative analysis found that WMT creates performance gains in both task-specific and task transfer tests and identified principles that account for task specificity, recovery, training duration and difficulty progression. To pave the way for use in football coaching, the WMT principles have been integrated into the tactical periodization method to produce a model WMT-football training cycle. This will validate methods of integrating WMT into best practice of football coaching, using game-based pedagogy. This research is the first of its kind in the field of football coaching. An overview of the working memory training literature and training principles will also be provided, followed by a presentation of the theoretical application of working memory training into a tactically periodised football coaching plan.

10:30 - 11:45

S28 MATCH ANALYSIS - PART III

S28.1
The assessment of speed changes in soccer and their effects on energy expenditure

Pietro Enrico di Prampero(1), C Osgnach(1), A Botter(1), A Olivieri(2), M Vettor(2), V Roberti(2)
(1) University of Udine, Department of Medical and Biological Science, Udine, Italy
(2) Exelio Srl, Udine, Italy

Soccer is characterised by frequent episodes of accelerated/decelerated running, the energy cost (EC) of which is difficult to estimate. We show here that, monitoring the players’ speed by GPS, it is possible to estimate EC, metabolic power requirement (MPr=EC*speed) and actual O2 consumption (VO2). Accelerated/decelerated running on flat terrain is biomechanically equivalent to uphill/downhill running at constant speed, the slope being dictated by the forward acceleration. Hence, since the EC of uphill/downhill running is known, if the time course of acceleration is determined, the corresponding EC and MPr can be estimated. This approach applied to video analysis data showed that, whereas during official soccer games, the time spent by the players at speeds > 16 km/h was ≈ 6 % of the total, the energy spent at MPr above that required to run at 16 km/h was ≈ 40 % of the total. We implemented this same approach into GPS devices monitoring the
players’ speed at 20 Hz (GPEXE ©), thus obtaining: EC, MPr and overall energy expenditure. Furthermore, assuming a monoexponential VO2 kinetics, we estimated the time course of actual VO2 from that of MPr, on the basis of the player’s VO2max (Patent Pending). Actual VO2, as determined by portable devices during repetitive shuttle runs closely matches the time course of VO2, as estimated by GPEXE ©. In conclusion, the use of GPEXE © whenever the use of these devices is allowed is a powerful tool for estimating the energetic characteristics of soccer and for selecting appropriate training strategies.

S28.2
Comparison of the movement demands of Australian National Rugby League referees under the '2-referee model'
Matthew D Jeffriess(1), CR Black(2), AJ Coutts(1)
(1) University of Technology Sydney (UTS), Faculty of Health, Lindfield NSW, Australia
(2) Elite Performance Unit, NRL Referees Department, Australia

Understanding the specific match demands of sports officials is essential for the design of specific training programs, particularly where referee roles differ (i.e. head referee (HR) vs. assistant referee (AR)). The objective of this study was to compare the movement demands of elite Rugby League referees, both head and assist referees under the 2-referee model. Global positioning systems (GPSports, 15Hz) data was captured from 18 fulltime referees over 314 (628 files) top tier Australian National Rugby League (NRL) matches during the 2013 and 2014 seasons. Physical activity profiles were created for both on-field referees and analysed for each match half. Total distance covered per half was (HR = 3942 ± 353m, 3902 ± 380m), (AR = 4040 ± 414m, 4057 ± 412m). Post hoc analysis showed AR completed more running at high speed (>14.4 km/h) and very high speeds (>19.8 km/h). AR match intensity was significantly (p < 0.05) higher than HR (AR = 89.1 m/min vs. HR = 86.7 m/min [first half], AR = 87.0 m/min vs. HR = 83.4 m/min [second half]). Similarly mean heart rates (%max) for AR were higher than HR (AR = 83 ± 11% max vs. HR = 75 ± 19% max [first half] and AR = 81 ± 11% max vs. HR = 74± 19% max). These findings highlight that there are different movement demands between HR and AR under the current two-referee model. These findings will help coaches train referees specifically for their on-field roles.

S28.5
Consistency of elite soccer referees' in-season training and match physical loads
Matthew Weston
Teesside University, School of Social Sciences, Business and Law, Sport and Exercise Subject Group, Middlesbrough, UK

Research into the training practices of soccer referees has demonstrated that most training sessions are physical (Weston et al., 2012), yet quantification of in-season physical loads eludes the literature. The aim of this study, therefore, was to quantify elite soccer referees’ in-season training and match loads. Eight professional soccer referees were monitored over four consecutive soccer seasons. During each in-season (September-April), detailed training diaries were compiled for each referee, including daily activity, training session typology, duration, intensity (CR10 RPE) and load
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(intensity*duration). Daily activities were subsequently reduced into four discrete categories; training (all physical training sessions), matches (all match-related activity; matches, travelling, 4th official), rest (no activity whatsoever) and injured (injury-enforced activity absence). Data were analysed using generalized and general linear mixed modeling, with magnitude-based inferences applied subsequently. A total of 7688 days were analysed (training [48.8%], matches [26.5%], rest [23.8%] and injured [1.0%]). Mean monthly activities were training 14.6 ± 3.9 days; matches 8.0 ± 2.8 days; rest 7.1 ± 3.8 days; and injured 0.3 ± 1.0 days. There was a possibly small difference (2.5 ±90% confidence limits 2.3 days) in training frequency between November and April. All remaining between-month frequency differences for training sessions (range of the differences 0.3 to 1.8 days), matches (-0.8 to 1.0 days), rest (-0.5 to 2.0 days) and injured (-0.4 to -0.1 days) were trivial. Mean training session intensity and load was 4.1 ± 2.0 AU and 241 ± 168 AU, respectively. Between-month differences were unclear for training session intensity (-0.17 to 0.23 AU) and load (-31 to 18 AU). Mean match intensity was 6.3 ± 1.6 AU, with between-month differences unclear (-0.33 to -0.10 AU). This study reveals for the first time the high degree of consistency of elite soccer referees’ in-season training and match loads. Future studies should examine a more detailed breakdown of training activities.

10:30 - 11:45
S29    CAREER PATHWAYS AND TALENT DEVELOPMENT - PART II

S29.1
New trends in career/talent development research: implications for football
Natalia Stambulova
Halmstad University, Academy of Health and Welfare, Halmstad, Sweden

This presentation will be focused on the most recent trends in career and talent development research in sport psychology with further elaboration on how this emerging knowledge might contribute to our understanding of career and talent development process in football. First, the junior-to-senior transition as a key transition within careers of the players who aspire to play on the elite/professional level will be considered as a process having a phase like temporal structure (e.g., preparation, orientation, adaptation and stabilization) based on the studies conducted in Sweden and the United Kingdom. Second, a dual career in football (i.e., combination of sport and education) will be considered on the example of Danish, Swedish, and Norwegian studies adopting the holistic lifespan perspective and emphasizing how players might search for an optimal balance between the two careers and relevant athletic and student identities. Third, the dual career will be considered from the holistic ecological perspective that is with a focus on players’ social environment and relevant organizational cultures facilitating dual careers on the example of Norwegian and Australian studies. Fourth, the emerging area of cultural transitions and their significance for global football context will be discussed with references to studies/reviews conducted in Finland, Denmark, Brazil, and Spain. Future directions of psychological career/talent development research in relation to football context will be outlined and further complemented by ideas for practical implications (e.g., psychological support in the junior-to-senior transition, dual career support services, and psychological support in cultural transitions).
S29.2
Psychological underpinnings of a cultural transition in football
Tatiana Ryba
KIHU – Research Institute for Olympic Sports, Department of Psychology, Jyväskylä, Finland

The globalising football landscape, in which crossings of geographic, cultural and political borders is now commonplace, has altered the trajectories of athletes’ careers. Most previous research paid only incidental attention to culture as a constitutive factor in psychological processes. In this paper, I draw on a series of research studies under the overarching theme of career transitions and adaptation in transnational career development to discuss the psychological underpinnings of a cultural transition occurring alongside other career transitions. My focus is on subjective career that emphasizes individual experiences of the career unfolding and the meanings ascribed to career events and identity. To understand the ways in which sociocultural influences act as constitutive at the individual level, I studied cultural adaptation as a process of subjectification of space and time occurring in everyday practices. Based on empirical data, I propose an understanding of cultural transition as a process of the conceptual transformation of meanings and the reconstruction of subjectivity. Furthermore, I raise a discussion of the concept of acute cultural adaptation (ACA), which considers psychological adaptation to a cultural transition as a negotiated process. Reviewing the psychological needs for autonomy, competence, and relatedness rendered crucial for experiencing wellbeing, the proposed theorisation suggests that ACA is mobilized through recalibration of the social networks in everyday life while drawing on a range of material and symbolic cultural resources to satisfy basic psychological needs. I will use football data to illustrate the conceptual arguments.

S29.3
Filling the void in talent development: fifteen years of practical experiences as a sport psychology consultant within youth football
Johan Fallby
Halmstad University, Center of Research on Welfare Health and Sport, Sweden and F.C. Copenhagen, Denmark

During the time between 2010 and 2014, 107 male football players represented Sweden in the U21 and/or the senior national squads competitive games. of those players 8,4% were originated from Stockholm. This is surprising because approximately 15% of all registered players in Sweden are located in the Stockholm area. Even more noteworthy is that in the national senior squad the representation from Stockholm clubs were even lower (2,6%). The aim of this presentation is to, from a psychological perspective, discuss some potential explanations for this disparity. A second aim is to discuss how to work to create optimal talent development environments. One potential explanation for the disparity is related to traditions. More specific, most Stockholm clubs are just focusing on winning trophies. To increase their chances to win they often select children at the age of seven or eight for their youth academies. Another potential explanation is that most clubs work in a traditional instructional way (i.e., favouring deliberate and blocked practice before deliberate play). Instead of working with early selection, result goals, and traditional instructions it is
suggested that clubs should base their work on the self-determination theory that emphasizes autonomy, competence and relatedness as fundaments for their player development environments. It is therefore recommended that both coach- as well as parent education programs are providing knowledge about the benefits of working with a self-determination perspective in talent development. A second recommendation for education programs is to provide examples about how to work to create optimal talent development environments.

12:00 - 13:00
S30  SPORT HISTORY. POLITICS AND POLICIES - A HISTORICAL PERSPECTIVE

S30.1
European football between tradition and postmodernity
Albrecht Sonntag
ESSCA School of Management, EU-Asia Institute, Angers, France

Over the last 25 years European football has undergone a dramatic evolution in various regards. As a child of modernity, born in the age of flourishing nationalism in the last third of the 19th century, football has always been firmly anchored in traditional values. The paradigm shifts undergone by contemporary professional football since the beginning of the 1990s have however pushed the world’s number one spectator sport towards what might be referred to, for want of a better term, as a “postmodern” configuration. Between 2012 and 2015, the FREE Project – “Football Research in an Enlarged Europe” (www.free-project.eu) – has carried out a variety of quantitative and qualitative surveys on different dimensions of contemporary football in Europe. The presentation will share some of the key findings of this large interdisciplinary research project that was supported by the 7th European Framework Programme and implied twenty researchers from nine different European institutions. It will deal particularly with issues of Europeanisation and transnational communication, perception and self-perception, migration and identification, as well as commodification and governance.

S30.2
A game of two sides: formal division of ZAR Rugby, 1889-1899
Colin du Plessis
University of Pretoria, Department of Historical and Heritage Studies, Pretoria, South Africa

The importance of sport in the revision of the past has gained much recognition in recent times and the genre of sport history has become ever more popular as a result. This paper attempts to locate the binary relationship of sport with concepts such as unification and division, inclusion and exclusion. While it is true that sport creates community and pulls people together, it is also true that sport often serves as a stage for division and social exclusion. In other words the emergence of inclusionary relationships in sport rests on the presence of in-group solidarity, which tends to highlight the divide between members of the group and non-members. Sport often also depends on or promotes closure within a group, which is most often coupled with exclusion. This study seeks to
identify the role of sport in societal division and social exclusion with regards to race, class and culture. For this paper rugby in the ZAR (Zuid Afrikaansche Republiek) will take centre stage. The early days of rugby football in the ZAR will be examined to determine the role the organisation and formalisation of the sport played in societal division. By looking into the founding of some of the most prominent clubs of the time - as well as the establishment of racially differentiated governing bodies or unions - e.g. the Transvaal Rugby Football Union and the Transvaal Coloured Rugby Football Union, this paper will investigate to what extent the formalisation of rugby football contributed to societal unity or division.

S30.3

**Soccer and sorcery. Performing history in the football environment**

*Katarzyna Herd*

*Lund University, Department of Arts and Cultural Sciences, Lund, Sweden*

Football feeds on personal stories where shreds of collective memory are used constantly. Ghosts of glorious victories, shameful defeats, heroes and holy shrines are regularly evoked. Historical references are performed to show a club’s character, validate its structure and also foretell its future. The cyclical character, intensity and speed of events around a football club, make it into a captivating historical experiment. Here I explore how history is constructed, used and performed, and what this process leads to in the context of Swedish football, concentrating on four clubs: Malmö FF, AIK, DIF and Helsingborgs IF. The football environment is very creative and flexible as it allows for various, sometimes contradictory, interpretations of history. It is therefore able to accommodate a plethora of views, personalities and narratives. While constructing the past to pave the way for the future, certain modes of inclusion and exclusion simultaneously appear. Further, constant reworking of the past highlights the flexibility of the concept of history. Football expresses strong traces of magic, as its rituals serve pragmatic, technical objectives rather than symbolize worship of a sacred notion. Thus, in magic you use gods, not believe in them. Further, magic transforms a collective phenomenon of football into individual experience. Throughout a soccer league season one can observe how emotional attachment is spontaneously created in the context of collective memory that makes up the official history of the clubs. This process exemplifies how history is used to build or to destroy in a specific socially constructed space.

13:45 - 14:15

**KP03 KEYNOTE PLENUM**

**KP03**

**Testing and training in football**

*Jens Bangsbo*

*NEXS, University of Copenhagen, Department of Nutrition, Exercise and Sports, Copenhagen, Denmark*

Professional soccer has become more and more intense, and the demands on the players are progressively increasing (Bangsbo & Iaia, 2013). There are clear evidence that fatigue occurs both
temporary and towards the end of game. Thus, training to increase the physical capacity of the players, making them able to recover faster from an intense action and enhance their endurance, is essential. Additional speed-endurance training during a 5-week period in the season has been shown to increase Yo-Yo intermittent recovery test level 2 (YYIR2) performance by 11% (Gunnarsson et al., 2012) and an extra 30 min of aerobic high intensity training a week for 8 weeks has increased YYIR2 performance by 18% (Jensen et al., 2007) in elite soccer players. The training in soccer should resemble those experienced during the game, e.g. changes of speed, direction and typical movement patterns, so that the specific muscle groups recruited in soccer are trained and the coordinative, technical and tactical elements are developed under physical demanding conditions similar to those encountered during actual match-play (Bangsbo & Mohr, 2014).

In order to achieve the goals of training, testing becomes a useful tool. The YYIR tests have been shown to be simple to execute and valid to evaluate players’ capacity to sustain and recover from repeated intense efforts. Both YYIR1 and YYIR2 activate the aerobic system maximally, with YYIR2 requiring a greater contribution of the anaerobic energy system. Performance in the YYIR tests is well related to match physical performance and they are sensitive enough to differentiate between players of different competitive levels and playing positions.

In conclusion, high-intensity training need be conducted in soccer and it should be specific to the individual technical, tactical and physical demands imposed on each single player.

References:


15:45 - 17:00
S31 TRAINING - PART II

S31.1 Power training in football
Jesper Løvind Andersen(1), P Aagaard(2)
(1) Institute of Sports Medicine, Bispebjerg University Hospital, Copenhagen, Denmark
Maximal muscle strength and power, including explosive strength (rate of force development: RFD) can be maximized by means of resistance training, however different types of training may lead to differential gains in one or the other parameter. Heavy-resistance strength training (HRST) has been demonstrated to lead to increased levels of contractile muscle strength in elite soccer players during isometric, concentric and eccentric muscle actions of maximal voluntary effort. Corresponding effects of HRST on maximal muscle power production have been reported as well, while more specialized types of resistance training (i.e. plyometric exercises) may also help to additionally facilitate gains in maximal muscle power production. The low incidence of maximal-velocity sprints compared to more short-lasting player actions of maximal acceleration over 10-30 meters suggest that power training in elite/sub-elite football should have a strong focus on improving muscular RFD. When working with football-players HRST is a key element for improving maximal muscle strength, RFD and power output, respectively, but we suggest broadening this training focus using the generalized term 'Muscle power training'. Muscle power training includes three levels: (i) Basic Muscle Power training that refers to training that aims at increasing muscle mass, strength and power, (ii) Transference Power training that aims at improving the ability to perform maximal or near-maximal football-related movements, and lastly (iii) Football Power training that aims to improve power output during intense, football-specific actions. It is of importance to realize that muscle power training is only one of several types of physical, technical and tactical training aspects that a football-player has to address in order to achieve improvements in physical capacity and football skills alike. Thus, strict and precise planning of muscle power training has to occur. Thus, given that limited time typically is available to the coach and player effective power training in its most optimal form may not be possible to reach. In conclusion, muscle power training is an effective and necessary tool in the training of football-players, both in an attempt to improve performance, but also to avoid injuries (see, Aagaard & Andersen, Eccentric training as treatment of muscle-tendon injury). With proper planning it is possible to incorporate power training that effectively facilitates increases in muscle mass, muscle strength and RFD. In turn, these qualities are transferred to increases in sprinting ability, acceleration/deceleration capacity and vertical jumping performance, which altogether provide a high agility level for the football-player.

S31.2
Effectiveness of treadmill versus ground-based over-speed training on speed, power, agility, and high intensity running ability in youth female soccer players

Riccardo Bucciarelli(1), F Yousefian(1), J Cresser(2), A Rocha(1), C Hawksworth(1)
(1) Soccer Fitness Inc., Vaughan, Ontario, Canada
(2) SC Toronto Soccer Club, Canada

Assisted Speed Training (“AST”), comprising 10 or more repetitions of supra-maximal intensity sprints aided by an elastic loading device, is a method of over-speed training that has been used to increase acceleration in soccer players. High Speed Treadmill Speed Training (“TST”), using an un-weighting harness, is an alternative method of over-speed training. As compared to AST, TST is
advantageous in that the workloads (running speeds) can be more effectively controlled. The aim of this study was to examine differences in speed (10m, 20m, and 35m sprint), jump height (“JH”), agility, and high-intensity running ability (“HIR”) following an AST versus TST training program. Sixteen (U14-U15) elite female youth soccer players were randomly assigned to either the AST or TST group. Both groups performed a 6-week, 2 sessions-per-week over-speed training protocol. The AST group performed 10 repetitions of a 3-second assisted sprint, whereas the TST group performed 10 repetition of a 3-second treadmill over-speed sprint, both with 60 seconds passive recovery between repetitions. Compared to AST, TST resulted in significant (P < 0.05) improvements in speed (10m sprint: TST, 1.88s ± 0.042; AST, 1.95s ± 0.096), JH (TST, 18.7cm ± 1.98; AST, 19.5cm ± 3.282), and HIR (TST, 800m ± 0.434; AST, 800m ± 0.912). There were no differences for 20m and 35m sprints, or agility between training protocols (P > 0.05). Based on the current investigation, it can be suggested that TST may be an effective training protocol to improve acceleration, leg power, and HIR ability in female youth soccer players.

S31.3
Subjective ratings for readiness to train do not predict training performance or capability in elite soccer players throughout a season
Jack Dowling(1), A Hulton(1), M Taberner(2), M Lake(1)
(1) Liverpool John Moores University, Department of Sports and Exercise Science, Liverpool, UK
(2) Everton Football Club, Liverpool, UK

Introduction: Relationships between subjective markers for readiness to train (muscle soreness (MS) and fatigue (FA)), ratings of perceived exertion (RPE) and training load (TL) measurements derived from GPS analysis remain unclear. Previous studies have found a moderate association between MS and RPE, on a match day (Arcos et al., 2014), and strong relationships between TL and RPE (Scot et. al., 2013), although findings are limited to short-term data collection periods. This study examined the association between GPS and subjective markers over a playing season.

Methodology: Match day -2 training data from seventeen elite players was collected during 25-weeks of the 2013-14 Premier league season. Prior to training, MS and FA were recorded and correlated with GPS markers of volume, intensity and load. RPE was recorded 10-20 mins post training and multiplied with training duration to calculate sessional load (sRPE).

Results: There were no significant correlations between subjective markers and GPS variables for the squad. However significant correlations between sRPE and both total distance covered (r=0.73, p< 0.05) and high-speed running (r=0.43, p<0.05) were observed. Further individual analysis only revealed one player having significant correlations between MS and training load variables.

Conclusion: Findings support work that demonstrated clear association between sRPE and GPS TL (Arcos et al., 2014), however, both perceived and measured TL variables were not related to MS or FA. Subjective ratings for readiness to train should be treated with a degree of caution, as they do not appear to predict training performance or capability.

15:45 - 17:00
S32 WOMEN'S FOOTBALL

S32.1 Physiology of women’s football from elite to recreational level
Magni Mohr
University of The Faroe Islands, Faculty of Natural and Health Sciences, Torshavn, Faroe Islands

Globally football has a fast growth in participation of women which is reflected in an increase in scientific research performed at elite, youth and recreational level over the last decade. Objectives: To review physiological demands in elite women’s football, as well as performance and health responses associated with participation in football match-play and training.
Methods: Match-analysis and fatigue during as well as recovery from games have been examined in high standard women players. Physiological measurements have been obtained during games and post-game recovery period. Performance and health adaptations from football training have been determined in detail for various women population groups.
Results: The activity pattern in women’s football encompasses prolonged intermittent exercise including short periods with high-intensity and explosive actions demanding high force development. Women football match-play taxes aerobic and anaerobic energy systems and provokes fatigue during and at the end of a game. Recovery of performance from a game is slow. Small-sided games at recreational level is challenging endurance as well as high-intensity and explosive exercise components, and induces marked beneficial effects on cardiovascular, metabolic and bone health in young and middle-aged sedentary women.
Conclusion: Women’s football match-play is physiologically demanding and causes fatigue as well as high taxation of aerobic, anaerobic and strength-associated exercise performance. Thus, aerobic high-intensity, speed endurance and power training should have high priority in women’s elite football. Football training markedly improves the general health profile of untrained women, and displays a high potential as prevention and treatment strategy of life-style related diseases in women.

S32.2 Neuromuscular fatigue and muscle damage in Women’s Rugby Sevens
Anthea Clarke(1,2), J Anson(2), D Pyne(1,2)
(1) Australian Institute of Sport, Department of Physiology, Bruce, ACT, Australia
(2) UCRISE, University of Canberra, Canberra, Australia

This study examined the relationships between on-field game movement patterns and changes in markers of neuromuscular fatigue and muscle damage during a two-day Women’s Rugby Sevens tournament. National (n=12, 22.3 ± 2.5 y, 1.67 ± 0.04 m, 65.8 ± 4.6 kg; mean ± SD) and State (n=10, 24.4 ± 4.3 y, 1.67 ± 0.03 m, 66.1 ± 7.9 kg) female representative players completed baseline testing for lower-body neuromuscular function (CMJ test), a muscle damage marker (capillary creatine kinase (CK)), perceived soreness and perceived recovery. Testing was repeated after games on days one and two of the tournament. GPS (5 Hz) data were collected throughout the tournament (4-6 games per player). National players were involved in small to moderately greater on-field
movements for total time, distance, high speed running (>5 m∙s⁻¹), and impacts >10g (effect size (ES) = 0.55-0.97), and displayed a smaller decrement in performance from day one to day two. Despite this, State players' had a much greater (ES=0.73) 4-fold increase in CK compared to the 2-fold increase in National players. Both groups had similar perceived soreness and perceived recovery while CMJ performance did not change. High-speed running and impacts >10g were largely correlated (r=0.66-0.91, ~±0.30 90% confidence limits) with ∆CK for both State and National players. A two-day Women’s Rugby Sevens tournament elicits substantial muscle damage, however, there was little change in lower-body neuromuscular function. Modest increases in CK can largely be attributed to the amount of high-speed running and the number of impacts >10g that players endure.

S32.3
Comparison of preferred and non-preferred leg kicking in females
Kevin Ball(1), L Parrington(2), B Hall(1)
(1) ISEAL Victoria University, College of Sport and Exercise Science, Melbourne Australia
(2) Swinburne University, Melbourne Australia

Kicking with the non-preferred leg is important in the football codes but punt kick research has focussed on males. Male-female differences in soccer kicking technique, in tasks such as single legged squats which might be related to the support leg during kicking, and in injury profiles indicate that findings for males might not generalise to females. This study compared preferred and non-preferred leg kicking in in female kickers. Fifteen elite players performed preferred and non-preferred leg kicks. Vicon measured kick technique (500 Hz) from kick leg toe-off until ball contact. Foot speed and knee angular velocity at ball contact and pelvis and knee range of motion were significantly larger and kick leg hip range of motion was smaller for the preferred leg. Postural differences existed at ball contact and the ball was kicked from a position closer to the ground and to the support leg allowing for a flatter kick trajectory. Movement sequencing from the hip/thigh to the knee/lower leg for the non-preferred leg suggested a less developed coordination pattern than the preferred leg, similar to findings for male athletes. However as the punt kick is an interceptive task, the demand of making sound contact with the ball is more difficult on the non-preferred leg so might also be contributing to this movement pattern. To improve the non-preferred leg in females, adjusting ball impact point and posture at ball contact might be useful.

S32.4
Physical performance of small-sided games in elite female soccer training
Jocelyn Mara, K Thompson, K Pumpa
University of Canberra, Research Institute of Sport and Exercise (UC-RISE), Bruce, ACT, Australia

Small-sided games (SSG) are modified soccer games, commonly used during training sessions to develop soccer-specific physical, tactical and technical performance without exposing players to the full physical load of a match. The aim of this study was to investigate the physical demands and heart rate response of different formats of small-sided training games. Eighteen elite female soccer players from the same national league team wore 15Hz global positioning system (GPS) devices
and heart-rate monitors during different formats (small, medium, large) of modified training games (n = 18). Information regarding work-rate, heart rate and acceleration profiles were collected. Preliminary analysis showed that mean distance covered per minute was 117m (SE = 1.06), 125m (SE = 1.12) and 122m (SE = 1.28) for small, medium and large sized games, respectively (p < 0.001, partial $\eta^2 = 0.054$). The percentage of time spent in heart rate zone 6 (> 180 beats/min) was 60% (SE = 2.52) for small games, 58% (SE = 2.91) for medium games and 44% (SE = 3.32) for large games (p < 0.001, partial $\eta^2 = 0.041$). In addition, the proportion of leading accelerations (starting speed > 1.5m/s) was 77% for small games, 70% for medium games and 67% for large games. The work-rate, heart rate and acceleration profiles differ between various formats of modified training games. Coaches can change the format of small-sided games to manipulate the training intensity and achieve specific training goals.

15:45 - 17:00
S33 GAELIC FOOTBALL

S33.1 Activate GAA: key lessons from the effective implementation of an injury prevention programme in Gaelic football

Philip Glasgow
University of Ulster, Sports Institute Northern Ireland, Belfast, UK

Background: Gaelic football has been described as Ireland’s national sport. Recent evidence suggests that injury rates in Gaelic football are greater than those observed in soccer but less than in rugby union; the most common anatomical region injured is the lower extremity.

Methods: The Activate GAA Warm-up was developed by the Sports Institute Northern Ireland in partnership with Ulster GAA in an attempt to address the apparent high injury rates in Gaelic football. Activate GAA was adapted from the successful FIFA 11+ programme and tailored to meet the specific needs of Gaelic football. The content of Activate GAA was designed through close collaboration with the sport governing body, coaches and sports medicine professionals. A key focus during development of the programme was securing coach and player buy-in. GAA coaches were surveyed one year after the launch of the Activate GAA to determine their perception of the programme and whether it had influenced changes in coaching practice.

Results: Results demonstrated that the Activate GAA was perceived as a positive contribution to coaching and that it had effectively influenced coaching behavior.

Conclusion: Key elements of the development and dissemination process were identified as critical factors in the success of the programme. These included the collaborative approach to development, effective piloting and refining of programme content, specific training sessions with key sport influencers, external validation of the programme from other football codes (soccer), news media coverage, detailed coaching resources as well as a structured coaching education programme.

S33.2 The work rate and metabolic power of elite Gaelic football

Shane Malone(1,2), K Collins(2), D Doran(1), AP McRobert(1)
Introduction: Gaelic football is an intermittent team sport within which the timing of movements are stochastic in nature. The aim of the current study was to identify the positional profile with respect of work rate and metabolic power of elite Gaelic football.

Methods: Fifty elite male Gaelic footballers players were tracked during match-play (n=173) using 4Hz GPS (VX Sport, New Zealand). Players were classified according to position; full-back (n=42), half-back (n=31), midfield (n=34), half-forward (n=39) and full-forward (n=27). Total distance (m), high intensity (>17 km.hr$^{-1}$) distance, sprint (>22 km.hr$^{-1}$) distance, number of accelerations and average metabolic power was considered. A multiple analysis of variance was performed. Data is reported as mean ± sd with statistical significance set at P≤0.05.

Results: During match play players cover a total distance of 8188 ± 1448 m with 1595 ± 594 m at high intensity and 445 ± 169 m sprinting. Players complete 181 ± 39 accelerations with an average metabolic power of 9.6 ± 2.3 W.Kg. Midfielders, half-backs and half-forwards had significantly (p=0.001) higher work-rates compared to full-backs and full-forwards. The metabolic power of midfielders differed significantly (p<0.001) from all positions. Half-backs and half-forward have a significantly (p=0.001) different metabolic loading pattern to full-backs and full-forwards.

Conclusions: Positional differences exist for both traditional running based variables and metabolic power. The current study demonstrates that metabolic power may contribute to our understanding of the physical demands of Gaelic football.

S33.3
The performance profile and physical demands of elite Gaelic football
Kieran Collins(1), D Doran(2)

(1) Gaelic Sport Research Centre, Institute of Technology Tallaght, Dublin, Ireland
(2) RISES, Liverpool John Moores University, Henry Cotton Campus, Liverpool, England, United Kingdom

Introduction: Successful performance in Gaelic football requires an appreciation of the physical demands and the capacities of the players to respond to those demands. The aim of the study was to examine the performance profile and physical demands of elite Gaelic football with respect of position.

Methods: Twenty-five elite male Gaelic footballers players participated. Countermovement jump, sprint speed (5, 10, 20m) and Yo-YoIRTL2 performance were determined. Players were tracked during seven competitive games (n=94) using 4Hz GPS (VX Sport, New Zealand). Variables were expressed per minute of playing time (m.min$^{-1}$). Distance, high-speed running (≥17km.hr$^{-1}$) distance (HSR) and very high-speed running (≥22km.hr$^{-1}$) distance (VHSR) were quantified. Players were classified according to position (full-back, half-back, midfield, half-forward and full-forward). A one-way ANOVA was used to identify within position variation. Mean ± SD are reported with significance set at p<0.05.
Results: Significant positional differences (p<.001) were evident in Yo-YoIRTL2 performance and not in the remaining performance variables. Half-forwards had the highest values (2088±148 m) followed by half-backs (1833±148m) and midfielders (1770±132m). The full-backs (1520±210m) and full-forwards (1440±158m) had the lowest scores. Significant positional difference in demands for distance (p<.001), HSR (p<.001) and VHSR were identified. Similar to YoYoIRTL2 scores a positional hierarchy is evident with half-forwards undertaking the highest volume of work (142±18m min$^{-1}$ distance; 31±9m min$^{-1}$ HSR; 8±3m min$^{-1}$ VHSR) and full-forwards the least (84±24m min$^{-1}$ distance; 14±4m min$^{-1}$ HSR; 6±3m min$^{-1}$ VHSR).

Conclusions: The data indicates significant positional variations. Coaches should consider the positional demands of the sport when planning physical training.

**S33.4**

**Acceleration and deceleration profiles in elite senior Gaelic footballers**

Declan Gamble(1,2), N Moyna(2), M Spencer(3)

(1) Sports Institute Northern Ireland, Belfast, NIreland
(2) Dublin City University, Dublin, Ireland
(3) Norwegian School of Sport Science, Oslo, Norway

Gaelic football is a field invasion sport, characterised by rapid changes in the direction of play as opposing teams’ transition between defence and offence. The purpose of this study was to quantify the acceleration and deceleration profiles and frequency of changes in direction of players. A total of 50 game (74±1min) files were used to examine the accelerometer data from 36 players. All accelerations and decelerations exceeding +/-1.5m/s were recorded, with high efforts being classified as exceeding +/-3.5m/s. Players were grouped as; full-back (FB, n=12), half-back (HB, n=12), midfield (MF, n=4), half-forward (HF, n=10) and full-forward (FF, n=12). Differences between positions were deemed likely positive/negative when there was >75% likelihood of the difference exceeding an effect size threshold of 0.2. There was no clear difference in total accelerations (range 41.0 – 52.2) or decelerations (range 74.4 – 105.5) between positions. However, there were likely positive differences between the number of high accelerations performed by FB vs MF (7.9 vs 5.5), MF vs HF (5.5 vs 8.0) and HF vs HB (8.0 vs 5.9). There were also very likely positive differences in the frequency of high decelerations conducted by FF vs HB (15.5 vs 10.1), HF vs HB (14.8 vs 10.1), and MF vs HB (20.8 vs 10.1). Moreover, there were very likely fewer changes in direction for FF (347.2) compared to HB (433.7), HF (418.3) and MF (468.0). In conclusion, positional profiles should be considered when designing conditioning drills to ensure that players are sufficiently prepared for competition.

**15:45 - 17:00**

**S34 WOMEN'S FOOTBALL**

**S34.1**

**The experiences of female elite football coaches**

Kari Fasting, TS Sand, HR Nordstrand

Norwegian School of Sport Sciences, Department of Social and Cultural Studies, Oslo, Norway
Though the lack of female coaches is an international phenomenon in sport in general, it is particularly visible in elite level sport, and so also in football. For example a recently published report about ‘The glass ceiling in European Football’, revealed that 90.8% of all senior coaching positions at (men’s) elite level clubs, and men’s and women’s national teams were white men. But how do the few elite level female coaches experience this fact and what does it mean to be a woman in such circumstances? Based on these thoughts the purpose of this presentation is to discuss the following question; what is the meaning of gender for elite level female coaches’ experiences in football? The data presented is based on qualitative interviews with 5 elite level female football coaches in Norway. The results showed that the experience of the strong male dominance in elite level football was a challenge both in relation to the carrying out of the coaching role itself, but also with respect to participation in further coach education courses and in relation to leadership style and networking. The fact of being a member of the minority group of female coaches also had an impact on their self-confidence. All agreed that it was easier for male coaches to get respect and that male competence was more valued than their own competence. These results are discussed in relation to the social construction of gender.

S34.2
Women’s football in Germany – economic perspectives
Marie-Luise Klein
Ruhr University of Bochum, Faculty of Sport Science, Bochum, Germany

The study’s objective is to analyse women’s football in Germany from an economic perspective. It highlights aspects from the production and consumer side of the women’s football market in Germany, with a special focus on the ‘Allianz Frauen Bundesliga’. At the production side, the analysis focusses on organizational peculiarities of the clubs, financial power and the mobility of the players. At the consumer side, stadium attendances and TV and media consumption are studied. As to the data sources used in this research, association and club data, special periodicals on women’s football, internet sites of the clubs, statistics of media coverage, etc. are analysed, quantitatively and qualitatively. The German Women’s Bundesliga is an amateur football league with, at most, semi-professional conditions for the players (increasingly migrants) and club managers. The twelve teams belong to three club categories, each of them offering different conditions for training and home matches: professional men’s, women’s-only, and local amateur soccer clubs. The club budgets today range from €500,000 to €1.7m. The attendances at the games of the Bundesliga clubs have increased as well as the media coverage, but the 2011 World Cup didn’t provide a breakthrough in the popularity of the game, the German Football Association and the clubs had hoped for. Women’s football in Germany is still a niche market. Financing the clubs solely by marketing revenues will not be an option in the foreseeable future. Top-level women’s football needs the financial support of the Football Association now and in the future.

S34.3
Japan - a pioneer country in women’s football
Bente Ovedie Skogvang
Facing the inequality between genders in possibilities to live as professional footballers, this study put focus on Japan as pioneer country in the professionalization of women’s football. During the 1990s players from Europe and Scandinavia went to Japan to realize their dream about being professional footballers. The players’ individual motives for playing football abroad will be highlighted. Players from Norway and Sweden who played professional in Japan between 1995 and 1999, and leaders and key informants who connected the players with Japanese football are interviewed. The findings show the importance of the Japanese sponsors and the level of professionalism and organization of the Japanese League. The good living conditions during their stay in Japan in combination with a professional development programme with very good training and playing conditions is underlined. However, their narratives suggest that the extraordinary economic gains offered by the Japanese sponsors, were in fact the main force behind the emigration to Japan. When the economic situation turned down in Japan in 1999, the players were fired and went back to Europe. Although the migratory flow to Japan did not last, it had a significant impact on the dynamics of the international migration of women footballers. Besides expanding the market to new frontiers, the professional conditions provided by the Japanese league, including much higher salaries, gave the players real professional status. In addition, the Japanese experience led to the creation of a social chain between Scandinavians and players from different countries that came to facilitate future international transfers.

15:45 - 17:00
S35 COACHES - SITUATIONS AND CAREERS PART II

S35.1 An analysis of activity types during youth soccer coaching sessions
Jordan Whelan(1), AP McRobert(1), WA Allison(2), PR Ford(1)
(1) Liverpool John Moores University, Liverpool, UK
(2) Football Development Division, The FA Group Burton, UK

During coaching sessions, youth soccer coaches use drill-based activities that provide limited transfer of acquired skill to match play more so compared to game-based activities that provide greater transfer. The aim of this study was to investigate the practice activities used by elite youth soccer coaches in England, the knowledge underpinning their use and where they were first acquired. Three practice sessions of lead coaches (n = 12), their teams (n = 12) and players (aged 10-16 years) from 3 Youth Academies at professional clubs in England were filmed. Percentage of session time spent in games- or drill-based activities was analysed. Coaches were interviewed about their reasons for using each activity and where it was first acquired. Players spent 59% of session time in games-based activity, 21% in drill-based and 20% in transition between activities. Coaches’ main reasons for using games-based activity were developing tactical knowledge, technical skill and decision making, whereas their main reasons for using drill-based activity were preparation for training games and developing technical skill. Coaches main acquisition source for the activities was emulating other coaches, as well as to a lesser degree coach education courses and created on
own. Contrary to previous research, players spent more time in games- compared to drill-based activities, demonstrating the gap between research and its application in the field has closed. Their main acquisition source for the activities was emulating other coaches and they had a good understanding of their rationales for using activities, showing the craft knowledge underpinning their work.

S35.2
Dealing with managerial challenges in professional football
Kjell Marius Herskedal, D Richardson, MS Nesti, M Littlewood
Liverpool John Moores University, School of Sport and Exercise Sciences, Liverpool, UK

Traditionally, the position of the Head Coach or Manager (hereafter Manager) in professional football has been associated with a prescriptive set of roles, including a planned, coordinated and integrated programme for player preparation. A key element in the Manager preparations has been the "learning by doing" ideology, emphasizing learning on the job rather than formal training and qualifications. In contrast, most professional football clubs incorporate increased levels of financial, marketing, legal and administrative expertise, calling for a wider range of managerial expertise. This suggests a real need to understand the perceived challenges faced by professional Football Managers and how they can be managed in effective ways. The current study explored professional Football Managers’ perceptions of challenges faced within the role and their strategies applied to deal with those. 13 professional league Managers in English and Norwegian football engaged in an individual, semi-structured interview using open-ended questions to examine their related experiences. Data was analyzed via inductive and deductive content analysis, revealing a range of coping strategies aiming to manage performance, organisational and personal related challenges. Although the link between sporting activities and finances seemed crucial to develop sporting and business performances effectively, only a few managed to undertake holistic (club) strategies in their work. Further, the findings argue for a more thorough pedagogical training of Football Managers. To manage in effective ways, it seems imperative that Managers and Head Coaches are self-aware and are able to determine the quality and efficacy of the strategies deployed in their role.

S35.3
Coach education intervention modulates soccer practice activities
Makoto Uji, RP Ford, NC Foster, AP McRobert, SJ Hayes
RISES, Liverpool John Moores University, Liverpool, UK

The transfer of acquired skill to match play from different practice activities occurring during coaching sessions is the key measure of their effectiveness. The aim of this study was to examine the effect of providing coaches with an evidence-based education intervention to modulate the types of practice activities used during coaching sessions. Participants were professional soccer coaches (n = 7) and their under-7 (U7) to U13 age group teams from an English Football Association Youth Academy. Four sessions were filmed per coach prior to and after the coach education intervention. Sessions were analysed for time spent in games-based activity and drills with active decision making (ADM) and non-ADM. ADM drills allow players on the ball two or more options based on
the movements of other players, whereas non-ADM drills allow only one pre-determined option. The transfer of acquired skill to match play from non-ADM drills is lower compared to ADM drills and games-based activities. The intervention involved the coaches observing games-based and ADM drill activities that were adapted versions of their own non-ADM drills, along with evidence-based rationales for their use. Following the intervention, there was a significant decrease in the use of non-ADM drills, but there was no significant increase in the use of ADM drills. Instead, coaches changed non-ADM drills into games-based activities. Coach education interventions positively influenced the use of practice activities, but coaches did not develop novel ADM drill activities, suggesting they might require additional training from skill acquisition specialists.

S35.4

The power of perception: player/coach perceptions of performance qualities in elite football

Craig Winstanley

University Centre Doncaster, Department of Sport, Doncaster, UK

Introduction: Developing self-awareness and commitment to achieving performance goals can be critical for success. Self-awareness, it is argued, enables the athlete to gain control over performance. However, little research has been conducted examining this topic area. The aim of this study examined perceptions of performance qualities and its potential impact on self-awareness.

Methods: Performance qualities were measured across 5 different factors, (a) technical, (b) tactical, (c) physical, (d) mental and (e) lifestyle in elite football players within the 2nd tier of English professional football. 16 players (mean age 17.25 ± 0.77) and 4 coaches (mean age 36.25 ± 4.65) completed a performance profile scoring system at the end of pre-season. The players rated their own abilities and the coaches also rated the players' abilities.

Results: Significant discrepancies were apparent across the whole group with players' perception of performance qualities rated significantly higher than the coaches' perceptions (P=.000) and across all factors (a) P=.001, (b) P=.000, (c) P=.001, (d) P=.000, and (e) P=.004) Discussion: Significant discrepancies between player and coach on the performance profile may result in poorer performances. Such discrepancies appear to predict failure, misplaced confidence and a lack of self-awareness. The profile may raise the athlete’s awareness of his or her own constructions of self, and the awareness of coaches as to the athlete's perception of performance. This could enable the athlete's construing to be understood better by the coach, and, thus engineer a more meaningful relationship and developed interventions which are closely allied to the athletes perceived needs.

S35.5

Background and evidence to support the Empowering Coaching™ education programme

Paul Appleton, J Duda

University of Birmingham, School of Sport, Exercise and Rehabilitation Sciences, Birmingham, UK

This presentation will outline the background and discuss the empirical evidence supporting Empowering Coaching™ (www.empoweringcoaching.co.uk). Empowering Coaching™ is an education programme (including a tutor-led workshop) informed by contemporary theories of motivation and behaviour change strategies, and is based on empirical evidence from over 20 years
of empirical research. The overall aim of Empowering Coaching™ is to make sport more engaging and empowering, for every athlete.

This aim is achieved by helping coaches create more empowering environments in sport, so that they can nurture quality motivation and maximise the experience of every athlete. Empowering Coaching™ has recently been tested in the context of grassroots football via the European PAPA project (www.projectpapa.org). Across five European countries (England, France, Norway, Greece and Spain), and with a sample of over 7000 10-14-year old footballers and their coaches, the findings from PAPA revealed that coaches who attended the Empowering Coaching™ workshop became less disempowering (compared to coaches that did not attend the workshop) over the course of a football season. In addition, the young footballers were less likely to drop-out of football when their coach had attended the Empowering Coaching™ workshop (compared to footballers whose coach has not attended the workshop). These findings were consistent across countries.

As football associations across the globe attempt to make football more enjoyable for all players and grow participation rates, the evidence from the PAPA project suggests Empowering Coaching™ should become a central component of coach education.
Association football referee performance and training

Carlo Castagna
Football Training and Biomechanics Laboratory Technical Department of the Italian Football Federation (FIGC), Coverciano (Florence) Italy & University of Rome Tor Vergata, Rome, Italy

Association Football (soccer) officials are required to keep up with play at all times to gain optimal positioning in making key decisions. The documented increase of match tempo and the evidence of an interaction between players and referees external load results in important physical and cognitive demands imposed on match officials (i.e. Field and Assistant Referees). However match officials are at least 10 years older than average players with some of them reaching their top of careers over 40 years. Furthermore only recently officials have gained the professional status in some of the FIFA (Federation Internationale de Football Association) federations and this mainly for field referees. This is limiting access to structured elite standard training. Aerobic fitness and the ability to repeat sprints are considered as fundamental fitness variables in soccer refereeing and consequently trained and tested at national and international level. Recently there has been interest on the “integrated-training” considering physical fitness and technical skill development concurrently. Despite the interest of integrated-training practical issue limits its use in daily training. The evolution of team tactics during the recent FIFA WC 14 suggests the interest of long-sprint endurance as additional ability to be trained in elite field-referees. Soccer official are reported to experience as much non-contact injuries as players, consequently proper prevention protocols were developed (FIFA 11+ Referee). Future studies addressing the effect of fitness training on match decisions of field and assistant referees are warranted.

Keywords: Football codes, Association Football, Training, Fitness development, Match officials

Epidemiology of injury in women’s football

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The popularity of women’s football is growing, and so does the number of female players. In 2006, it was estimated that about 10% of all football players worldwide are female, which is about 29 million. Twenty epidemiological studies were found on exposure-related injury rates of adult (n=12) or youth (n=8) female football players during the season, and six during tournaments (n=3 on U-19 or older players, n=3 on younger players). Almost no epidemiological information is published on female football players under the age of 15 years. for adult female football players, the
incidence of time-loss injuries during the season varied between 12.5 and 23.6 per 1000 exposure hours for match injuries, and between 1.2 and 7 per 1000 exposure hours for training injuries. The incidence during top-level international tournaments was 30.3 per 1000 match hours. For youth players, the incidence of match and training injuries were similar, the injury rate in tournaments ranged from 0.9 to 38.9. Knee, ankle and thigh were the most frequently injured body parts. The proportion of head injuries during the season ranged between 4 and 14%. From the NCAA data, it seems that head and knee injuries are more frequent in matches, and thigh injuries in training. Injuries of the anterior cruciate ligament (ACL) are a special concern in women’s football due to their severity and long-term consequences.

**S36.2**
Evaluating markers of ACL injury risk during simulated soccer match-play: a biomechanical and isokinetic investigation

*Raja Mohammed Firhad Raja Azidin(1,2), S Sankey(1), B Drust(1), M Robinson(1), J Vanreterghem(1), F Bossuyt(1)*

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This study aimed to investigate the influence of simulated soccer match-play on markers of ACL injury risk related to knee and hip mechanics and isokinetic muscle strength imbalances. Eighteen male recreational soccer players completed a 90 min lab-based overground match-play simulation. Kinematics and kinetics of the support leg during unanticipated 45° side cutting manoeuvres (open and crossover) were recorded as part of the simulated match-play, providing multiple trials within each 15 minutes interval. Participants also performed five maximal dominant-limb isokinetic contractions for concentric quadriceps (Qcon) and eccentric hamstrings (Hecc) prior to exercise (time 0 min), at the beginning and end of half-time (time 45 min and 60 min), and post-exercise (time 105 min). A one-way repeated measures ANOVA was used to identify significant differences over time, with $\alpha=0.05$. Knee abduction moments were significantly reduced during the intervals 30-45, 60-75 and 90-105 min compared to the interval 0-15 min. The knee was significantly more extended at touch down during the second half compared to interval 0-15 min. The hip was also significantly more extended in the last 15 minutes of simulated match-play. A significant reduction in Hecc and functional Hecc:Qcon ratio were observed at all times compared to pre-exercise values. The more erect landing posture at touch down, reduced eccentric hamstring strength and muscle imbalances suggested a greater risk of ACL injury during the latter stage of match-play, supporting epidemiological observations and implying that screening during/after simulated match-play may be more effective in identifying increased ACL injury risk in soccer players.

**S36.3**
A comparison of injuries sustained on artificial and natural soccer turfs among premier soccer league football players in Zimbabwe

*Edward Chagonda(1,2)*

(1) Zimbabwe Football Association, Harare, Zimbabwe
Background: The International Federation of Association Football (FIFA), through their Goal project, renovated Rufaro stadium from natural turf (NT) to artificial turf (AT). This was met with mixed feelings especially with regard to injuries sustained by football players. Zimbabwe has no published studies.

Objectives: To determine the attitudes of players regarding the different football playing surfaces, the incidence and severity of injuries on AT and NT in all sixteen Zimbabwe's Premier Soccer League teams for the 2013 season. Methods: A questionnaire was used for the players attitudes and a prospective cohort was employed for the injuries. Match injuries were recorded using standard FIFA tools.

Results: 325 players responded to the questionnaire of which 295 (90.8%) preferred playing on NT and 250 (76.9%) believed that AT was associated with more injuries. 364 injuries occurred during 270 matches (4455 player hours) of exposure giving an overall injury incidence of 81.7 injuries/1000phrs. 69 matches (1138.5phrs) were on AT with an injury incidence of 85.2 injuries/1000phrs while 201 matches (3316.5 phrs) were on NT with an incidence of 80.51 injuries/1000hrs. There was no statistically significant difference in the incidence of injury between AT and NT [incidence rate ratio= 1.06; 95% CI: 0.84 – 1.34]. Injury severity ranged from 31.6/1000phrs (on AT, mild category) to 1.8/1000phrs on NT severe category) with insignificant incidence rate ratios.

Conclusion: Players believe that the AT is associated with an increased injury risk. There was no difference in injury incidence rates and severity between the AT and NT.

17:15 - 18:15
S37 TESTING - PART II

S37.1 Functional Movement Screen: poor relation with athletic performance
Matthew Attwood, S Roberts, KA Stokes, G Trewartha
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Introduction: The Functional Movement Screen (FMS) comprises seven movement patterns described as fundamental to athletic performance. This study investigated FMS scores in 436 English community rugby union players and the relationship between FMS score and performance in a battery of fitness tests.

Method: Players (age (mean±SD), 24.6±4.9 years; height, 180.5±6.7 cm; body mass, 93.4±13.4 kg; body fat, 14.3±5.1%) were stratified into three playing levels: Semi-professional (n=114); Amateur (n=194); and Recreational (n=128). Participants completed the FMS and vertical jump, isometric pull, 10-m and 40-m sprint, Illinois agility and Yoyo intermittent recovery level 1 (YOYO-IR1) performance tests.

Results: Differences, determined by Kruskal-Wallis H test, indicated no differences in FMS score between Semi-professional (FMS=14.3±2.8), Amateur (FMS=14.2±2.3) or Recreational (FMS=13.7±2.4) players ($\chi^2(2)=3.11, P=.211$). Differences were identified between Semi-
professional and Recreational groups for vertical jump ($t_{(287)}=3.60$, $P=.005$), DYNO ($U_{(284)}=5787$, $P<.0001$, $Z=-4.99$), 10-m ($U_{(285)}=6013.55$, $P=.007$, $Z=-2.710$) and 40-m sprint ($U_{(285)}=5294.5$, $P<.001$, $Z=-4.345$), Illinois ($U_{(280)}=14787$, $P<.001$, $Z=-4.345$) and YOYO-IRL1 ($U_{(244)}=4575$, $P<.001$, $Z=-3.734$). Spearman’s rank correlation coefficient ($r_s$) identified weak correlations between FMS and vertical jump ($r_s=.30$, $n=411$, $P<.001$), YOYO-IR1 ($r_s=.28$, $n=330$ $P<.05$), 10-m ($r_s=-.25$, $n=376$, $P<.001$) and 40-m sprints ($r_s=-.27$, $n=377$, $P<.001$) and Illinois agility ($r_s=-.28$, $n=366$, $P<.001$).

Conclusion: There were no differences in FMS score between Semi-professional, Amateur and Recreational levels of rugby despite apparent differences in physical performance. FMS alone was a poor predictor of physical performance in this population, with only weak relationships identified between FMS score and physical performance outcomes.

S37.2
Spatial memory precision in elite and non-elite youth soccer players
Lot Verburgh(1,2), M Konigs(1), E Scherder(1), P van Lange(3), J Oosterlaan(1)
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It has been shown that neurocognitive functions such as adaptability, inhibition and attentional skills may underlie success in sports. One neurocognitive function that may be related to tactic play and positioning in the field is spatial memory. The current study therefore investigated temporal stability of spatial memory precision and its interaction with the information load in youth elite soccer players as compared to non-elite soccer players. Twenty-six soccer players between 8 and 13 years of age (mean age 11.3, SD 1.3) performed a visual short term memory (VSTM) task. The task consisted of a low and a high information load condition (first or second target bar recall), which each consisted of 15 direct recall trials and 15 delayed recall trials. Dependent variables were the deviations (in °rees) from the target for both information load conditions and delay (0 or 3000 ms). Group differences were tested for both conditions (low and high memory load) using repeated measures analysis of variance. An interaction was found between group and delay (F(1,23)=4.5, $p<.05$, partial eta2=.16) on the high information load condition This indicates that at the high load condition, the elite soccer players outperformed the non-elite soccer players. Preliminary results show that youth elite soccer players show extremely stable spatial memory in the delayed high information load condition. This may be highly relevant for performance on the soccer field, because environment and positions of several aspects such as information on ball and opponent positions must be remembered and in order to perform well.
S37.3
Reliability and validity of Yo-Yo tests in football players and matched untrained school students across 9-16 years

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(2) School of Sport and Exercise Sciences, Faculty of Medicine and Surgery, University of Rome Tor Vergata, Rome, Italy
(3) University Institute of Maia (ISMAI), Maia, Portugal
(4) Copenhagen Centre for Team Sport and Health, University of Copenhagen, Copenhagen, Denmark, College of Life and Environmental Sciences, University of Exeter, Exeter, UK

This study aimed at analysing the reproducibility and construct validity of three age-adapted Yo-Yo intermittent tests in football trained and untrained age-matched girls and boys aged 9-16.

The participants (n=269) performed Yo-Yo intermittent tests according to their age group (YYIR1C: 9-11-year-olds; YYIE1: 12-13-year-olds and YYIE2: 14-16 year-olds) 7 days apart to register the test-retest reproducibility. Total distance covered and relative exercise peak heart rate (%HRpeak) were determined. Typical error of measurement (TEM) expressed as a percentage of the coefficient of variation (TEM as %CV), intraclass correlation coefficient (ICC) with 95% confidence intervals (95% CI), Student’s unpaired t-test, smallest worthwhile change, and Bland-Altman plots with the limits of agreement were used.

The Yo-Yo intermittent test-retest TEM as %CV for distance covered was 10.6, 10.6 and 10.1% for the football trained group aged 9-11, 12-13 and 14-16, respectively, with corresponding values for the untrained group being 10.4, 12.2 and 9.6%. ICC values were considered as excellent. Yo-Yo intermittent tests performance was 33% (940±564 vs. 634±223 m), 51% (1826±846 vs. 890±332 m) and 67% (1201±678 vs. 402±150 m) better (P≤0.01) for the football trained than the untrained group aged 9-11, 12-13 and 14-16, respectively. Relative exercise peak heart rate during the tests did not differ significantly between the groups in test and retest.

Yo-Yo intermittent tests performance and HRpeak are reliable for 9-16-year-old footballers and untrained girls and boys. Additionally, performances of the three Yo-Yo tests were seemingly better for the football trained than for the untrained participants, providing evidence of construct validity.

S37.4
Relationship between Yo-Yo IR2 and physical performance during small-sided games in soccer

Tom Stevens(1), C de Ruiter(1), P Beek(1), G Savelsbergh(1,2)
(1) Research Institute MOVE, Faculty of Human Movement Sciences, VU University Amsterdam, The Netherlands
(2) Academy of Physical Education, Amsterdam University of Applied Sciences, The Netherlands

Introduction: The team sport-specific Yo-Yo IR2 assesses the ability of players to recover from highly anaerobic repeated exercise (1). In professional soccer maximal testing is often not possible in-season. However, during small-sided games (SSG), which are intrinsically soccer-specific and
frequently used during soccer training, performance most likely also depends on physical fitness. The aim of the study was to investigate the relationship between Yo-Yo IR2 and physical outcome measures during SSG.

Method: 14 Dutch Eredivisie (22±4 yrs) and 9 Dutch First Division (20±1 yrs) male soccer players performed within 10 days a maximal Yo-Yo IR2 and a 4x7 min 6v6 (including goalkeepers) SSG with 2 min of passive rest between bouts (pitch size: 40x34m). Time-motion and heart rate (HR) data were collected using LPM (Innotio, Amsterdam, The Netherlands). Average metabolic power (MP) was estimated using di Prampero’s equation (2).

Results: for both the Eredivisie and First Division team Yo-Yo distance correlated (Pearson’s r) significantly (p<0.05) to SSG total distance (r=0.71 and 0.69) and MP (r=0.85 and 0.66). Grand mean (n=23) average SSG-HR was 93±2% of maximal Yo-Yo-HR (r = 0.59).

Conclusion: SSG can possibly provide useful information in evaluating players' physical fitness.

References:

S38 CAREER PATHWAYS AND TALENT DEVELOPMENT - PART III

S38.1 The effects of a team building intervention in young elite football players

Johan Wikman, R Stelter, NK Petersen, A-M Elbe
Center for Team Sport and Health, NEXS, University of Copenhagen, Denmark

Introduction: Team cohesion has shown to positively correlate with adherence and team performance. The purpose of the present study was to investigate the effects of a team building intervention on team cohesion in young elite football players.

Method: 152 male football players aged 12 to 19 were enrolled in the study (mean age = 15.69, SD = 1.75). Four teams were assigned to an intervention group (n = 74) and four teams to a control group (n = 78). The intervention group participated in one-hour team building sessions that took place once per week for 12 weeks. A Danish version of the Group Environment Questionnaire (Carron et al., 1985), which measures four dimensions of team cohesion, was administered at baseline and at the end of the intervention. Semi-structured interviews were conducted with six participants in the intervention group and analysed with a thematic content analysis.

Results: A linear regression model revealed that the intervention group’s score in one dimension of team cohesion, namely Group Integration – Social significantly increased compared to the control group (0.46, CI: 0.02 to 0.89, p = 0.45). Results of the interviews suggested that participants had responded well to the intervention, and transferred team building content to their behaviors on the football field.

Discussion: The results suggest that team building can be used as an effective method to increase cohesion in young elite football teams.
S38.3
Patterns of motor abilities and technical skills as predictors of success for young elite football players
Marc Zibung, C Zuber, A Conzelmann
University of Bern, Institute of Sport Science, Bern, Switzerland

Sport-motor tests play an important role in football talent selections. However, single tests represent only parts of the complex game performance. The best game performance therefore does not necessarily need to go hand in hand with the best results in all tests of a test battery. Considering the complexity of the game performance appropriately, a holistic perspective together with a person-oriented approach are applied. Thereby, systems consisting of several variables are identified and analysed in a longitudinal study. Following this idea, six sport-motor tests were aggregated into a subsystem. 106 young male elite football players were tested three times (2011, 2012, 2013; Mage, t2011=12.26, SD=0.29). One year later (2014) their performance level was enquired. Data were analysed using the LICUR method, a cluster analytical method. Four patterns were identified, which remained stable at all measuring points. The players frequently show intraindividual and structurally similar patterns over time. At the third measuring point, a pattern occurred out of which the players are significantly more likely to advance to the highest performance level one year later. This pattern appears consistently above average, but does not always show best test performances. The significantly frequent development along structurally stable patterns suggests a predictive validity of the subsystem sport-motor tests between the ages of 12 to 15. Above average, but not necessarily outstanding performances both in the motor abilities as well as in the football specific tests appears to be particularly promising. This finding emphasizes the need of a holistic perspective in the talent selection.

S38.4
Creativity, decision making and visual search in skilled soccer players
André Roca(1), D Memmert(2), PR Ford(3)
(1) School of Sport, Health and Applied Science, St Mary’s University, Twickenham, London, UK
(2) Institute of Cognitive and Team/Racket Sport Research, German Sport University Cologne, Germany
(3) Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, UK

The ability to produce creative solutions is a key part of expert performance. The aim of this study was to examine creativity in the decision making and visual search behaviours of skilled soccer players during simulated 11-a-side match play. Players were required to interact with a representative life-size video-based simulation of attacking situations. They responded at a key moment by playing the ball in the most appropriate manner for each situation presented. Moreover, they were required to name other additional actions they could execute for each situation. Creative performance on the task was measured using the three observation criteria of originality, flexibility, and fluency of decisions. Visual search behaviours were examined using a portable eye-movement registration system. Players were classified as more- or less-creative based on their performance on
the representative task. The more-creative players produced more appropriate, original, flexible, and fluid decisions compared to less-creative players. The creativity-based differences in judgment were underpinned by differences in visual search strategy. More-creative players employed a broader attentional focus including more fixations of shorter duration in a different sequential order and towards more informative locations of the display compared with less-creative players. Creative performance is underpinned by different underlying visual processes when compared to less-creative performance, which appears to be crucial in facilitating more creative solutions.

17:15 - 18:15
S39 MORALITY

S39.1 Doping in football: a moral psychology perspective
Maria Kavussanu
University of Birmingham, School of Sport, Exercise and Rehabilitation Sciences, Birmingham, UK

Research investigating psychosocial factors associated with doping intentions is essential for the fight against doping. In this study, which was funded by the World Anti-Doping Agency, we tested a conceptual model of doping intentions in football. Performance motivational climate (i.e., the situational goal structure), moral atmosphere (i.e., the dominant team norms), and moral identity (i.e., the importance one places on being moral) were distal predictors of doping intentions, while ego orientation, moral disengagement (i.e., the justifications people use for doping) and anticipated guilt were considered mediators of the effects of the distal predictors on doping intentions. Participants were 1,432 elite football players recruited from three European countries: UK (n = 506; 251 males; mean age 18.42); Denmark (n = 463; 214 males; mean age 21.00); and Greece (n = 463; 256 males; mean age 21.82). They completed questionnaires assessing the aforementioned variables. Structural equation modelling showed that the hypothesized model had a marginal fit to the data (CFI: .89, RMSEA: .05). An alternative model had a good fit (CFI: .93, RMSEA: .04) and explained 49% of the variance in doping intentions. In this model, performance motivational climate, moral atmosphere, and moral identity predicted doping moral disengagement, which, in turn, predicted doping intentions through anticipated guilt. Moral atmosphere and moral disengagement also had direct effects on doping intentions. These findings suggest that the socio-moral environment of the team may lead footballers to use doping substances to enhance their performance, while a strong moral identity could deter them from using such substances.

S39.2 Sport science and elite football: what’s the Bobby Moore?
Peter Kennedy
Glasgow Caledonian University (GCU), Department of Social Sciences, Media and Journalism (SSMJ). Glasgow, Scotland, UK

This paper examines the elective affinity between sport science and elite football by situating it within the dynamics of the market and work situation elite players experience in the modern game.
On the one hand, elite footballers exert a powerful bargaining force in their market situation, which sport science has the potential to enhance and sustain. On the other hand, the football club’s relative lack of control of the player’s market situation makes control over the players work situation all the more necessary, resulting in the increasing application of sport science to the football labour process. The concluding argument is that the impact of sport science on elite football is contradictory, facilitating the development of football as an aesthetic experience, while also threatening to transform football into a mundane exercise in the search for increased functional peak performance for its own sake.

S39.3
Social costs to French professional footballers: the future of French apprentices after eviction from football academies

Pierre-Cédric Tia
Evry University (CPN) and Caen University (CesamS), Evry, France

The purpose of this communication is to expose the future of French apprentices after their eviction from football academies and analyse their social conditions many years later. These important social phenomena is often ignored in French football issues. Well, more than 80% of them, per age group, don’t become professional footballer. So, most of them are forced to rebuild a professional and social future. We decided to investigate qualitatively these social phenomena thanks to semi-directive interview close to fifteen ex-apprentices (between 21 and 27 years old). The potent result of this research shows that ex-apprentices pass by a career change process which is divided into four phases (trauma, dedication, dilemma and metanoia). Moreover, when we compare the career change process of these young players, we can observe social class differences in social conditions. On the one side, the ex-apprentices from popular class (7/8) are present in the dedication and dilemma phases and still hope to become professional footballer many years later. On the other side, we have got ex-apprentices from upper class (7/7) in the metanoia phase. All of them have totally transformed their mind in order to build an other professional career. Finally we can say that ex-apprentices’ calling for the work of professional footballer slows the achievement of their career change process. But for those who come from popular class, it’s often means a precarious lifestyle and social instability.
SATURDAY, 23 MAY 2015

09:00 - 10:15
S40 TACTIC AND TECHNIC

S40.1
Intensity and technical actions in female youth soccer games
Christina Ørntoft(1), MN Larsen(1), TB Andersen(2), LS Rasmussen(2), MB Randers(1), Peter Krustrup(1,3)
(1) Copenhagen Centre for Team Sport And Health, University of Copenhagen, Copenhagen, Denmark
(2) Department of Public Health - Sport Science, Aarhus University, Denmark
(3) Sport and Health Sciences, College of Life and Environmental Science, St Luke’s Campus, University of Exeter, Exeter, United Kingdom

The purpose of this study was to evaluate activity profile, heart rate and technical performance in 7v7 and 8v8 football games for 9-10-year-old girls (U11). A total of 32 female youth players participated in the study, all playing 20-min 7v7 and 8v8 games with 160 and 223 m2 per player, respectively. Activity profile, number of technical actions and heart rate (HR) were measured during the games using 5-Hz GPS, video filming and HR monitors. The number of technical actions was higher in 7v7 than in 8v8 games (34±19 (±SD) vs. 28±14, P=0.03, d=0.37) as was the number of successful actions (25±16 vs. 20±12, P=0.01, d=0.35) with no difference in the success rate for the technical actions (70±13 vs. 69±14%, P=0.63, d=0.07). No difference was found between 7v7 and 8v8 in total distance covered (1574±251 and 1622±281 m, P=0.66, d=0.18), peak speed (19.5±2.6 and 20.7±1.5 km∙h⁻¹, P=0.16, d=0.56) and mean HR (169±8 and 172±10 bpm, P=0.87, d=0.30). Distance covered at the highest running speeds of >16 km∙h⁻¹ was lower in 7v7 than in 8v8 games (34±24 vs. 63±34 m; P=0.018; d=0.98), as was the number of entries into this speed zone (8±5 vs. 13±7, P=0.006, d=0.82). In conclusion, there were a higher number of technical actions and successful actions found in 7v7 than in 8v8 games, but the players covered more ground with high-speed running in 8v8. The study also revealed that heart rate and number of technical actions and running bouts were high in both game formats for U11 girls, with no difference between formats.

S40.2
Attacking and defending team behaviour in 8v8 and 11v11
Sigrid Olthof(1), WGP Frencken(1,2,3), KAPM Lemmink(1,2)
(1) Center for Human Movement Sciences, University of Groningen, University Medical Center Groningen, The Netherlands
(2) School of Sport Studies, Hanze University of Applied Sciences Groningen, The Netherlands
(3) Football Club Groningen, The Netherlands
Objective: A team’s tasks differ between attack and defence during a soccer match. The tactical organization of the players during these tasks is often practiced during training in 11v11 or small-sided games. To investigate the tactical representativeness of small-sided games, this study compared tactical team behaviour of Under-15 soccer players during attack and defence in 8v8 and 11v11 training games.

Methods: Thirty-two talented soccer players participated in this study (age 14.4 ± 0.3 years). Six 8v8 and three 11v11 training games were played on pitch sizes of 100x70m and 70x45m, respectively. Positional data were collected (LPM-system) to determine tactical team variables: length, width and surface area in attack and defence relative to pitch size (mean±SD). Differences between tactical behaviour during attack and defence in two training formats (8v8 and 11v11) were statistically evaluated.

Results: Relative length, width and surface area was larger during attack than defence in an 8v8 training game (p<.05). Only relative width increased during attack in an 11v11 training game (p<.05). Relative length was larger in 8v8 than in 11v11 (p<.05).

Conclusions: Tactical behaviour was in line with the nature of soccer of increasing and reducing space in attack and defence, respectively. However, teams expanded their team organization in length, width and surface area during attack in 8v8 games, whereas in 11v11 games teams only expanded in width. Although smaller training games are often used for an optimal preparation of 11v11, tactical behaviour differs between training formats. Coaches can use these findings to practice different organizational patterns.

S40.3
Effect of the small-sided games and conventional aerobic interval training on the various physiological characteristics and defensive and offensive skills used in soccer
I Ozcan(1), Niyazi Eniseler(2), C Sahan(3)
University of Celal Bayar, Manisa, Turkey

Introduction: The aim of this study was to investigate the effects of small-sided game training (SSGT) versus conventional aerobic interval training (CAIT) on soccer specific endurance performance, lactate threshold levels 4-mM, defensive and offensive skills used during a soccer match.

Methods: Before and after a 7-week training intervention period, Eighteen amateur soccer players (age 21.8±4.8 years) were tested. Tests included the lactate threshold (OBLA) test, the Yo-Yo Intermittent Recovery Test Level 2 (Yo-Yo IR2), Loughborough Soccer Passing Test (LSPT); soccer test match. The heart rate (±5 beats/min) corresponding to the lactate threshold levels 4-mM was used as an individualized exercise intensity during sessions. Individualized training load for each session was controlled and optimized by real time heart rate feedback using short-range radio telemetry during SSGT and CAIT. Both SSGT and CAIT were performed for two days a week and consisted of four sets of 6min work periods with 3min of passive recovery between sets. SSGT and CAIT training was added to the normal training sessions. Mann-Whitney U and Wilcoxon Signed Ranks tests were used to examine the differences between the groups and within groups.
Results:

<table>
<thead>
<tr>
<th>Variables</th>
<th>CAIT Group (n=9)</th>
<th>SSGT Group (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>OBLA (km(^{-1}))</td>
<td>10.6±1.5</td>
<td>11.8±1.5**</td>
</tr>
<tr>
<td>Yo-Yo IR2 (meter)</td>
<td>1057.7±359.5</td>
<td>1826.6±432.6*</td>
</tr>
<tr>
<td>LSPT (second)</td>
<td>54.4±8.1</td>
<td>57.5±13.9</td>
</tr>
<tr>
<td>Defensiveskills(N)</td>
<td>17±9.8</td>
<td>12.1±4.9</td>
</tr>
<tr>
<td>Offensiveskills(N)</td>
<td>59.2±26.5</td>
<td>70.8±23.2</td>
</tr>
</tbody>
</table>

*\(P<0.05\); **\(P<0.01\), significantly different from pre-intervention value.

The percentage of improvement of LSPT score and the number of defensive skills during the match was higher in the SSGT group than the CAIT group (\(p<0.05\)).

Conclusion: The results of this study suggested that a 7-week of small-sided games training improved short-passing ability in LSPT, defensive and offensive skills in soccer, and various physiological parameters.

S40.4
Influence of ball possession on physical and technical indicators in FIFA World Cup
Gustavo Ribeiro da Mota(1), C Thiengo(2), S Gimenes(3), PS Bradley(4)
(1) Human Performance and Sport Research Group, Federal University of Triângulo Mineiro, Uberaba, MG, Brazil
(2) Ativa Intervention in Physical Education and Sports, Bauru, SP, Brazil
(3) São Paulo State University, Bauru, SP, Brazil
(4) Carnegie School of Sport, Leeds Beckett University, UK

Purpose: To examine the influence of high (HPBPT) and low percentage ball possession teams (LPBPT) on physical/technical indicators during 2014 FIFA World Cup Finals (FWC).

Methods: Data were collected from FWC players (n=346) using a multiple-camera computerised tracking system.

Results: Players in HPBPT covered similar distances in total and at low, medium and high speeds compared to LPBPT (\(P<0.01\); Effect Size [ES] trivial-small). Players in LPBPT covered more distance without the ball (WOP) but less with the ball (WP) than HPBPT (\(P<0.01\); ES large). All positions in LPBPT spent less time in the opposing half and attacking third than the players in HPBPT (\(P<0.01\); ES small-moderate), but all positions in HPBPT completed more short and medium passes than LPBPT (\(P<0.01\); ES moderate). Players in HPBPT produced more solos runs into the attacking third and penalty area than LPBPT (\(P<0.05\), ES small). Defenders of LPBPT attempted more tackles to gain the ball than defenders of HPBPT (\(P<0.05\), ES small), but defenders of HPBPT produced more solo runs into the attacking third and penalty area than defenders of LPBPT (\(P<0.05\), ES small). Midfielders in HPBPT completed more solos runs into the attacking third than LPBPT (\(P<0.01\), ES moderate). Forwards in HPBPT were caught offside more often, and produced more solo runs into the attacking third (\(P<0.05\), ES moderate-small), and tackled events (\(P<0.05\), ES small).

Conclusion: High percentage ball possession does not influence the physical demands of international matches although it is related to more time spent in offensive areas of the pitch.
Acknowledgements: This study was supported by a grant from FAPEMIG - Fundação de Amparo à Pesquisa do Estado de Minas Gerais

09:00 - 10:15
S41 FATIGUE - PART II

S41.1 Reliability of a range of fatigue variables in elite soccer players
Robin Thorpe(1), T Strudwick(1), M Buchheit(3,4), G Atkinson(2), B Drust(1), W Gregson(1)
(1) Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, UK
(2) Health and Social Care Institute, Teesside University, UK
(3) Sport Science Department, Myorobie Association, Montvalezan, France
(4) Performance Department, Paris Saint Germain FC, France

Balancing the stress of training and competition with sufficient recovery is a fundamental challenge in the training process. Knowledge about the effectiveness of non-invasive monitoring tools assessing fatigue status in athletes is paramount. However, limited data exists quantifying the reliability of fatigue measures in elite soccer, therefore the aim of this study was to establish the reliability of a range of fatigue variables in elite soccer players. Resting perceived mood state scores (fatigue, muscle soreness, sleep quality, stress, appetite and energy), counter-movement jump height (CMJ), post-exercise heart rate recovery (HRRbpm and HRR%) and heart rate variability (rMSSD and LnrMSSD) were measured on two separate occasions 24-hours apart in thirty-five elite soccer players. Paired t-tests were used to determine if any systematic bias was observed between days. Reliability was assessed by the typical error of measurement, expressed as a coefficient of variation (CV). Perceived ratings of fatigue (p=0.73; CV 12%), soreness (p=0.38; CV 9%), stress (p=1.00; CV 7%), energy (p=0.17; CV 11%), appetite (p=0.69; CV 11%) and HRRbpm (p=0.17; CV 14%), HRR% (p=0.79; CV 9%), CMJ (p=0.99; CV 4%), were not significantly different between days. rMSSD (p=0.05; CV 28%), Ln rMSSD (p=0.04; CV 10%) and perceived ratings of sleep (p=0.04; CV 13%) were significantly different between days. The present results suggest that the use of CMJ, HRR%, perceived ratings of wellness and to a certain extent HRV have good reliability within an elite soccer environment. Therefore these measures show particular promise to establish the fatigue status of elite soccer players.

S41.2 Recovery after training in elite youth soccer players: sleep on it?
Michel S Brink(1,2), RPJ Zuurbier(1,2), WPG Frencken(1,2,3), KAPM Lemmink(1,2)
(1) Center for Human Movement Sciences, University of Groningen, University Medical Center Groningen, The Netherlands
(2) School of Sports Studies, Hanze University of Applied Sciences Groningen, The Netherlands
(3) Football Club Groningen, Groningen, The Netherlands

Introduction: The body-restoration theory suggests that sleep is important to recover from exercise. However, little is known about this topic in adolescent athletes. Therefore, the aim of the current
study was to investigate the relations between training load, sleep and recovery in elite youth soccer players.

Methods: Fifty-nine elite youth soccer players (16.4 ± 1.5 years of age) from an U19, U17 and U15 squad participated in the study. Training duration (minutes), session Rating of Perceived Exertion (6-20), sleep duration (minutes), sleep quality (1-10) and Total Quality Recovery (TQR, 6-20) were determined during 4 in-season weeks. Pearson correlation coefficients were calculated to examine the relations.

Results: Average training load was 1136 ± 445 (AU) per day and players slept 8.6 ± 1.3 hours per night. Sleep quality was rated as 7.0 ± 1.2, indicating good sleep. Average TQR score was 15.7 ± 1.76, which corresponds with good recovery. Higher training load was related to poorer TQR (r= -0.26; N=879; p<0.05). Both longer sleep duration (r= 0.07; N=853; p<0.05) and better sleep quality (r=0.24; N=860; p<0.05) were associated with higher TQR.

Conclusion: Sleep duration and especially sleep quality are related to perceptions of recovery in elite youth soccer players. This underlines the importance of adequate sleep behavior in these young talents.

S41.3
Correlation between the perceived recovery status, wellness and salivary markers of health in soccer players
Darren J Paul, O Caro, G Nassis
ASPETAR – Qatar Orthopaedic and Sports Medicine Hospital, National Sports Medicine Programme, Doha, Qatar

The perceived recovery status scale (PRS) has been introduced as a tool to assess the readiness to train but limited data exist on its application in soccer. PURPOSE: To examine the relationship between the PRS, players’ wellness and salivary markers of stress and illness.

Methods: In part A, 10 under-17 and under-19 soccer players, who played more than 70min of an afternoon friendly match, participated. PRS, wellness questionnaire (modified Hooper index scale (HIS)) and salivary IgA & cortisol concentration were recorded in the morning of match day and about 24 hours later. In part B, sum of HIS and PRS were correlated for a sample of 22 under-17 & under-19 players using the same protocol.

Results: PRS was lower and HIS higher post-match (P<0.05) indicating lower level of subjective recovery compared to pre-match. Salivary IgA tended to be lower (P=0.09) and cortisol higher (P=0.18) post-match. The change in PRS correlated with the change in HIS (P<0.05) both in part A (r= -0.50) and B of the study(r=-0.52,).

Conclusion: The perceived recovery status scale may be used as an alternative to the Hooper scale to assess players’ readiness to train. The advantage of the perceived recovery scale (short length) makes it a useful tool when working with large groups.
S41.4
Responses to an intensified period of match play amongst elite youth footballers
Neil Gibson(1), S MacNay(2), T Mullen(2), R McCunn(3), C Twist(2)
(1) Heriot-Watt University, Centre for Sport and Exercise, Edinburgh, Scotland, UK
(2) Chester University, UK
(3) Saarland University, Germany

Limited evidence is available regarding the performance of youth soccer players during multiple matches with minimal recovery. Therefore this study investigated the effect of total playing minutes on the response to an international tournament, consisting of six games of 60 min played over five days, in youth soccer players. Thirty players (mean age 14.1 ± 0.38 years) were grouped into low (<250 min; LPG, n = 18) and high (≥250 min; HPG, n = 12) playing groups according to accrued playing time (min) and monitored daily for lower body power (W; LBP) and perceived welln

S41.5
Mental fatigue impairs footballer performance
Michele Merlini
University of Kent, School of Sport & Exercise Sciences, Canterbury, UK

Background: Mental fatigue is a psychobiological state caused by prolonged periods of demanding cognitive activity. Although the impact of mental fatigue on cognitive and skilled performance is well known, its effect on physical performance has not been thoroughly investigated.

Methods: In a randomized crossover study, 12 football players performed to exhaustion of their capacity the Yo-Yo IRT Lev 1 after 30 min of a demanding cognitive task (Stroop Test) or 30 min of reading a magazine (control).

Results: After experimental treatment, a mood questionnaire revealed a state of mental fatigue (P <0.001) that significantly reduced distance to exhaustion (1203 ± 402 mt) compared with the control condition (1410 ± 354 mt) (P <0.001).

Discussion: This negative effect was not affected by cardiorespiratory and musculo-energetic factors as physiological responses to intense exercise. Self-reported success and intrinsic motivation related to the physical task were also unaffected by prior cognitive activity. However, mentally fatigued subjects rated perception of effort during exercise to be significantly higher compared with the control condition (P = 0.002). As ratings of perceived exertion increased over time in both
conditions (P < 0.001), mentally fatigued subjects reached their maximal level of perceived exertion and disengaged from the physical task earlier than in the control condition. Conclusion: In conclusion, our study provides experimental evidence that mental fatigue limits exercise tolerance in football fitness test through higher perception of effort rather than cardiorespiratory and musculo-energetic mechanisms.

Effect of treatment on exhaustion distance. The treatment reports a significant difference (#) in covered distance between control (CON) and Stroop group (EXP). Significant main effect of condition, P <0.01).

09:00 - 10:15
S42 TRAINING - PART III

S42.1 Effects of training load on inflammation and muscle damage during a pre-season period in elite soccer players
S Coppalle(1,2), C Groussard(1), G Ravé(2), W Kebsi(1), Hassane Zouhal(1)
(1) Movement Sport and Health Sciences (M2S)-UFR-APS, University of Rennes 2-ENS Rennes, Rennes Cedex, France
(2) Stade Lavallois MFC, Laval, France

Purpose: This study investigated the evolution of biological parameters in professional soccer players throughout a pre-season and explored a possible link between muscle damage, inflammation and training load.

Methods: The training load of a whole pre-season (40 sessions) was analyzed in 23 professional soccer players (mean± SD: age 26.4±5.3 years, body mass 75.7 ±6.1 kg, height 180.8±5.8 cm). Training load estimation was conducted by using 1)- the Rating of Perceived Exertion (RPE) method and 2)- GPS data (total distance covered, distance covered at high intensity). Muscle damages (plasma LDH, CPK) and inflammation (plasma CRP) were analyzed using blood veinipuncture before and after 6 weeks of training camp.

Results: High intensity distances on average per week were respectively: (16-20 km/h: 1942±916.4m, 20-25 km/h: 859.2±410.7m, >25 km/h: 166.6±95.5m). The total distance (TD) per week was 32643.9±11033.1m. Internal load per week was 2659.8±722.9. CPK and LDH did not show any significant variation during the studied period. Only, CRP significantly increased (P<0.05). Significant correlations were observed between the distance covered over 16 km/h and LDH ($r$ =0.87; P<0.05) and CPK ($r$ = 0.88; P<0.05). TD was also significantly correlated to LDH
Conclusion: Our results showed that the training load may impact inflammation and muscle damages markers in professional soccer players during the pre-season. This must be taken into account in the subsequent training periods of the season.

S42.2
Physical demands of street soccer - effect of boards
Morten B Randers, J Brix, JJ Nielsen, P Krustrup
University of Copenhagen, Department of Nutrition, Exercise and Sports, Copenhagen Centre for Team Sport and Health, Copenhagen, Denmark

Small sided street soccer is popular, but how boards surrounding the pitch affect activity profile and physiological response is unknown. We therefore recruited 11 healthy moderately trained men (28.4±4.2±(±SD)y, 24.2±2.4kg/m/m, 19.9±4.2%fat, 47.7±6.0ml/min/kg), who in a randomised order completed 3-a-side street football sessions on a 20x13 m pitch with (WB) or without boards (WOB). Sessions consisted of a standardized warm up followed by 4x12min games interspersed with 4 min rest. Heart rate (HR, Polar Team2), blood lactate, RPE and activity profile (10Hz GPS-MinimaxX S4) were measured. Mean HR was higher during WB than WOB (85.7±5.4 vs. 81.3±8.2%HRmax, P=0.012, d=0.64), with no significant difference in peak HR (96.7±3.1 vs. 94.7±4.9%HRmax, P=0.066, d=0.49). No significant differences were observed between WB and WOB in mean blood lactate (4.9±1.8 vs. 4.1±1.6mmol/L, P=0.082, d=0.43) or peak blood lactate (6.1±2.0 vs. 5.3±1.9mmol/L, P=0.107, d=0.42). RPE was higher after WB than WOB (7.1±1.0 vs. 5.5±1.2, P<0.001, d=1.39). Player Load was higher in WB than WOB (413±68 vs. 350±62AU, P<0.001, d=0.98). However, lower total distance (2677±318 vs. 3053±477m, P=0.003, d=0.93), distance at 5-13km/h (1009±270 vs. 1448±379m, P=0.002, d=1.33) and distance >13 km/h (46±26 vs. 112±61m, P=0.002, d=1.41) were observed during WB than WOB. Peak speed was also lower during WB than WOB (16.1±1.8 vs. 18.1±1.9km/h, P=0.002, d=1.08). Boards affected activity profile and physiological response with higher mean HR, Player Load and RPE, but less total distance and lower peak speeds during 3-a-side street soccer.

S42.3
Is there a place for static stretching in warm-up routines of soccer players?
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The objective of the study was to investigate the impact of static and dynamic stretching singularly or combined within a warm-up on a soccer-specific intermittent protocol (SSIP). Seven semi-professional players aged 21.9±2.0) years old [height 181.5±9.4 cm, body mass 74.8±6.4 kg] following screening and ethical approval, completed a VO2max test and were familiarised with the SSIP. Within a 3-week period, participants undertook 3 different warm-ups, before completing the SSIP, consisting of three bouts of exercise with a 15-min recovery after the 2nd bout to simulate a soccer match. After the 3rd bout participants completed an intermittent time to exhaustion test
Warm-ups consisted of 5-min activity, then 10-min of Static Stretches (SS), Dynamic Stretches (DS) and SS+DS (SS-DS) in a randomised-crossover order. Core temperature (Tc) and VO\textsubscript{2} were recorded throughout. Testing took place in an environmental chamber, replicating UK conditions (9°C, 50% relative humidity). ITTE was 8.2(±2.3), 9.0(±4.6), and 10.7(±5.9) min for the SS, DS and SS-DS groups. Tc in the SS-DS (38.4±0.3°C) was higher (P<0.05) than the SS (37.9±0.4°C) during the 1\textsuperscript{st} ITT bout. Tc was 38.3(±0.6)°C for the DS condition. Differences in Tc during the first two bouts disappeared in the 3\textsuperscript{rd}. Participants in the DS (78±9.5%) and SS-DS (76.3±15.1%) exercised at a lower (P<0.05) %VO\textsubscript{2}\textsubscript{max} than the SS (83.0±15.4%). Combining SS and DS is more beneficial than SS alone during a warm-up, and may be more beneficial than DS alone. A second warm-up is necessary as benefits associated with the initial warm-up dissipate during the half-time break.

S42.4

Measuring game insight skills of elite young football players

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The aim of the study is to examine the game insight of talented young elite soccer players using a video temporal occlusion technique paradigm (1). Focussing on their performance in 4-vs-4 (2) and 11-vs-11 (3) football games and cognitive functioning (4) by the Attention Networking Test (ANT). Eight coaches judged independently several 4 by 4 games and were asked to rank players according to their game insight abilities. This rating is novel compared to other studies and will validate all other variables used. In the video occlusion task the players had to anticipate the trajectory of an oncoming ball. During the task the visual information is temporal occluded at 80 ms before ball contact (-80 ms), at ball contact (0 ms) or 80 ms after ball contact (+80ms). Two groups were created based on the coaches ratings: one with a high level of game insight (HL; n=5) versus one with a lower level of game insight (LL, n=6). For the video task a significant interaction is found for group by occlusion (F(2, 11.8)=5.26, p=0.034). The HL group scored significantly better in the 0 and +80 ms contact conditions. In addition HL group performed significantly better in the 4-4 games (t(5.8)= 6.86) as well in the 11-11 games (t(8.3)= 4.5). No differences between groups were found with respect to the cognitive tests. The findings indicate that the video occlusion task proved to be a valid differentiator for measuring game insight in young football players.
S42.5
Football training improves bone health in middle-aged sedentary women with no effects of swim-training

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(4) University of Exeter, Sport and Health Sciences, College of Life and Environmental Sciences, Exeter, UK

Objective: To examine effects of football and two swim-training protocols on bone health in sedentary middle-aged women.

Methods: Eighty-three sedentary women (age; 45±2 (±SE) yrs, height; 165±1 cm, weight; 79.2±1.5 kg, body fat; 42.9±0.6%) were randomized into three training groups: football (F, n=21), high-intensity intermittent (H, n=21) and prolonged moderate-intensity swimming (M, n=21), and a control group (C, n=20). The training-groups completed three weekly sessions for 15 wks. Bone turnover markers (BTM) were analyzed and DXA scans performed pre and post intervention.

Results: In F, plasma osteocalcin, P1NP and CTX-1 increased (P<0.05) by 37%, 52% and 42%, respectively, with no changes in M, H and C. The induced BTM increases in F were larger (P<0.05) and the post-intervention plasma concentrations of BTM were higher (P<0.05) than in M, H and C. In F, total leg BMC increased (P<0.05) by 3.3% and 2.6% in left and right leg, respectively, but remained unaltered in M, H and C. Total leg BMD did not change in any of the four groups. In F, BMC and BMD increased (P<0.05) in femoral shaft (1.6 and 1.9%), femoral trochanter (3.0 and 2.8%) and total hip (2.1 and 1.6%) with no change in M, H and C.

Conclusion: In sedentary middle-aged women, 15 wks of football training elevated bone turnover markers and increased leg bone mineral content. In contrast, no changes were seen after prolonged submaximal or high-intensity intermittent swim-training. Thus, football seems to be a potent stimulus for osteogenesis in middle-aged women.
female soccer is still in its developmental stage. Comparing both national teams allows us to identify psychological factors that might be important for the future development of female soccer. Players of the male ($n=23; M_{age}=26.06$) and female ($n=26; M_{age}=23.65$) Swiss national soccer teams completed psychological screening measurements as part of their world cup preparation campaign. The on-site web-based survey covered different performance relevant psychological topics (i.e., self-determination, anxiety, cognitive interference, action-orientation, dominance, compensatory effort, learning motivation, goal setting, confidence, competitiveness, automatization, and relaxation). Both teams showed comparably high self-determination, good automatization and learning motivation as well as high competiveness. However the females also revealed some remarkable shortcomings. They showed a higher level of anxiety, less dominance, less confidence, and used less goal setting than the male players. During games the female players revealed to have more distracting thoughts and reported less action orientation after failure than the male players. Controlling for age did not affect the results. The findings suggest that sport psychologists should pay more attention to specific mental factors, in which females still show some deficits. Working on these deficits might be important for a faster development of professional female soccer in Switzerland.

S43.2

**Contribution to a qualitative assessment of cohesion in sports groups**

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Although cohesion is a major object of study of general psychology and social psychology in particular, we have chosen in this study to approach cohesion from the prism of sociology of organizations. The vast majority of researchers to measure cohesion within a sports group seems to have adopted in their work for almost a thirty years the Group Environment Questionnaire (GEQ) developed by Carron, & Wedmeyer Brawley in 1985 (Kenneth Dion and 2000). But the effective implementation of this quantitative assessment tool cohesion sports groups in the work from the psychological approach has identified a number of limitations that we consider to be important, since that can skew the results obtained. Observation of breaches attributed to the GEQ has led us to propose from a more sociological approach, a qualitative assessment tool cohesion sports groups: it is the strategic and systemic analysis of Crozier and Friedberg in 1977. The aim of our paper is to propose a new type of evaluation of cohesion sports groups: the qualitative assessment. This new evaluation improves most limits assigned to GEQ and therefore promotes a better measure of cohesion sports groups.

Keywords: Cohesion, sports groups, quantitative assessment, qualitative assessment.
S43.3
A qualitative study of authentic leadership in football

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Understanding leadership in football coaches is important because effective leadership could help to improve football players’ performance and lead to other positive outcomes such as team satisfaction and performance. This study was designed to investigate authentic leadership in professional football coaches. Authentic leadership is defined as ‘A pattern of leader behaviour that draws upon and promotes both positive psychological capacities and a positive ethical climate, to foster greater self-awareness, internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, fostering positive self-development’ (Walumbwa et al., 2008). The football environment offers a useful context to introduce the concept of authentic leadership given the highly publicised debates of ethical and unethical practices of coaches.

One-to-one semi-structured interviews were conducted with 11 high level football coaches. A combination of deductive and inductive reasoning was employed in the development of interview questions. Deductive questions were generated based on Walumbwa and colleagues (2008) four dimensions of authentic leadership: relational transparency, self-awareness, internalised moral perspective and balanced processing. Inductive questions were used to explore coaching experiences in an elite environment.

Transcripts were analysed using thematic analysis broadly informed by Grounded Theory. Preliminary results indicate four key themes: relational transparency, self-awareness, internalised moral perspective and reflectivity; balanced processing did not emerge as a theme in our interviews. Results also highlight the moral dilemmas faced by coaches when it comes to cheating and gamesmanship, a crucial component of ethical practices of football coaches. Coaches’ accounts support the applicability and usefulness of authentic leadership and provide evidence that elements of authentic leadership exist in football.

S43.4
Make or break? The 18-21 phase of development through the perspectives of the under21 coach within elite level football

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The academy to first-team transition has been something of a hot topic within professional football research over the last decade. However, research to date has only appeared to cover the transitioning phase. A recent special edition chapter highlighted the need for an 'extra' development phase within elite level football. These concerns have also been addressed by the Elite Player Performance Plan (2011), which has created a 'new' "post academy", or "18-21 phase" of development. The aim of this study was to examine, through the perspectives of under21 development coaches working within elite level English Premier League clubs, the cultural,
psychological and social issues young players face at this critical phase of development. Under 21 development coaches' (n=6) were interviewed. Data was analysed using content analysis principles with verbatim text aligned to the emerging themes. Under21 development coaches highlighted players at this stage of development experience an array of psychological issues due to players not being given a chance at first team level and often stagnating rather than developing at the 18-21 phase of development. Furthermore, all coaches reported players need to be "mentally tough" and "resilient" amongst other characteristics to successfully survive within the first team of an elite level football club; however coaches were unable to identify how to develop these characteristics. Aligning with previous research, it appears young talented players are ill-prepared psychologically to successfully transition to the first team environment, however also face critical identity issues as they struggle to adapt, develop and grow within this critical period of development.

09:00 - 10:15
S44 MIGRATION & INTEGRATION

S44.1
Sport-contextual factors and psychological integration: a cross-sectional study in multicultural youth football teams and related coaches in the Netherlands
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Objectives: Lately, the sport domain is being promoted as a promising arena for integration in multicultural societies. However, research on intergroup contact within the sport context is rather scarce. This cross-sectional study aims at further investigating the role of intergroup contact within the organized team sport setting as a means of social integration. In a first step, the effects of the football setting’s contextual factors on psychological integration at the team level in both, minority and majority team members were analyzed. In a second step, and specifically for the group of minority players, it was investigated whether integration on the team level might have the potential to be translated from the specific sport context the broader societal level, by increasing overall national identification.

Methods: Cross-sectional data was collected from 32 teams in two amateur football clubs in the Netherlands at the end of the winter season 2014. Participants were youth soccer players aged 10-17 years and their coaches. Measurements of the sport setting’s contextual factors included the ‘ree of the football teams’ ethnic diversity (Blau Index) and both coaches’ and players’ perceived motivational climate (MCSYS). Psychological integration at the team level was assessed by players’ perceived team inclusion (GIS) and team identification (multicomponent in-group identification scale). To investigate positive integrative outcomes on a broader societal level, the survey included additional items assessing players’ ethnic and national identification.

Results: The results of this study will be presented and discussed.
S44.2
Football as promotion of active citizenship and identity development - supporting boys in a school with high percentage migration background
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This study aims to investigate the possible effects of football as a social tool to develop social capability, identity and active citizenship in an area with major social challenges in Denmark. Through the team processes inherent in football, boys, aged 12 to 16 from a public school, are encouraged and motivated to develop life-skills to support everyday life. Furthermore they learn to be part of a team, enhancing their social capability which expands their possibilities for adjusting to society. 3 weekly training sessions, matches and coach education for motivated boys are part of the study, but also social experiences (clubhouse events, excursions and visiting role models) are a vital part of the study.

Methods: The study is qualitatively oriented, including observations and interviews as the methods. Results: The boys have developed their social capabilities in the school environment. They show a more profound understanding of the structure of the local society. The team members, who have participated regularly show increased self-confidence and express realistic expectations of their football and school ability. Lastly the social and cultural coherence in the team has been expressed to be enhanced due to the study.

Conclusions are not definite yet, but will indicate how to structure and work with active citizenship through football. The main result will thus point out the social effects football can have for these boys, and how football can help to establish a connection and network to the broader society.

10:30 - 12:00
S46 HEALTH - PART III

S46.1
Players’ heart
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It is well known that intense physical exercise can result in the development of Athlete’s Heart characterized by increased chamber dimensions, wall thickness and bradycardia. Accordingly, increased cardiac dimensions have been demonstrated in elite football players together with improved left ventricular diastolic function and improved right ventricular systolic function compared to non-athletes.

In normal sedentary subjects recreational football twice a week can induce significant changes in cardiac structure and function already after 12 weeks of regular training. The improvements in
function have been demonstrated in both men and women over a broad spectrum of age groups. The most consistent finding is an improvement in left ventricular diastolic function and football training seems to be a stronger stimulus to cardiac adaptation compared to for example running at the same average intensity. Clinical conditions such as arterial hypertension and diabetes can be associated with a wide spectrum of myocardial dysfunction. Comprehensive echocardiography including tissue Doppler imaging and speckle tracking analysis can detect early signs of hypertensive and diabetic cardiomyopathy. Recent studies suggest that football training may improve systolic as well as diastolic function in sedentary men with hypertension and Type 2 diabetes evaluated by comprehensive echocardiography.

In conclusion regular football training induces positive cardiac adaptations in elite athletes, normal subjects and in patients with diabetes and arterial hypertension.

S46.2
Positive effects of short term football on bone health in men undergoing androgen deprivation therapy for prostate cancer

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(9) Sport and Health Sciences, College of Life and Environmental Sciences, University of Exeter, St Luke's Campus, Exeter, Devon, UK

Introduction: Androgen deprivation therapy (ADT) in prostate cancer (PCa) management reduces bone mass and increases fracture rates.

The aim of this study was to evaluate the effects of football training on bone mass and bone turnover markers in men with PCa.

Methods: This was a 12 weeks long trial assigning men with PCa during ADT to a football intervention group (FG, n=29) training 2-3 times per week for 45-60 minutes or a usual care control group (CON, n=28). Outcomes included femur, total leg, lumbar spine, and total body bone mineral
content (BMC) and density (BMD), markers of bone turnover (serum procollagen type I N propeptide [s-PINP], serum C-terminal telopeptide of type I collagen, [s-CTX], and osteocalcin). Activity profile in FG during training was measured using a 5-Hz global positioning system (GPS).

Results: Mean total distance covered during training was 2.16 km (±0.62) and high intensity running (>11.0 km/h) accounted for 8.5% of this distance. The number of intense accelerations and decelerations (>1.6 m/s/s) was 30 (±24) and 34 (±27), respectively. Analysis of change scores from baseline to 12 weeks showed between group differences in favor of FG in total body BMC (26.4 g, 95% CI: 5.8 to 46.9 g, p=0.013), leg BMC (13.8 g, 95% CI: 7.0–20.5 g, p<0.001), s-PINP (36.6 µg/L, 95% CI: 10.4 to 62.8, p=0.008) and osteocalcin (8.6 µmol/L, 95% CI: 3.3 to 13.8, p<0.01).

Conclusion: A short term football intervention improved bone health parameters in men during ADT for PCa.

S46.3
The FIFA Sudden Death Registry (FIFA-SDR): first results
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(1) Institute for Sports and Preventive Medicine, Saarland University, Saarbrücken, Germany
(2) FIFA, Zurich, Switzerland

Objectives: In 2014 the FIFA-Sudden Death Registry (FIFA-SDR; www.sudden-death-in-football.com) was launched, aiming to detect the frequency of sudden death during football and to identify the causes as precisely as possible with a special focus on sudden cardiac deaths and arrests, and therefore, to improve screening and preventive measures.

Methods: The registry is a confidential web-based database and conducted by the Institute of Sports and Preventive Medicine in Saarbruecken, Germany. The database records cases of sudden death and sudden cardiac arrest (including cases of sudden cardiac arrest which the patient survives) occurring during or within one hour after sporting activity.

Results: So far, sudden deaths in football were registered in 23 cases. The mean age of the 22 male players and one female player was 27 ± 11 years. 20 players deceased from a sudden cardiac death, 3 suffered from a lethal traumatic injury. 15 deaths happened during the match, 2 during the warm up, 1 after the match, and 5 during training. 4 sudden cardiac arrests could be resuscitated (2 myocardial infarctions, 1 coronary anomaly, 1 unknown underlying disease). Compared to the German sudden cardiac death registry the international cases of sudden deaths during football were younger (22 ± 5 vs. 35 ± 15 years).

Conclusion: Although sudden deaths during football seem to be rare, these preliminary data support a pre competition medical assessment due to the young age of deceased players, as a main reason for sudden cardiac deaths under the age of 35 years are congenital heart diseases.

S46.4
Strenuous exercise and endothelial function in professional soccer players
Nikolaos Androulakis(1), N Koundourakis(1), M Marketou(2), P Spatharaki(3), E Nioti(3), J Christoforakis (1), M Alexandrakis(3)
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(2) Department of Cardiology, Iraklion University Hospital, Iraklion, Greece
**Objective:** To examine whether strenuous exercise can lead to endothelial activation and/or dysfunction in professional soccer players due to exercise induced oxidative stress.

**Methods:** Twenty-three (15 non-smokers and 8 smokers) healthy, elite male professional soccer players (mean Age: 25.2±4.3 years, BMI: 23.1±1.3 kg/m², Fat: 7.8±2.6%), were selected for this study. All participants had a full clinical and laboratory evaluation. Von Willebrand factor antigen (vWF Ag) plasma levels were measured on two different occasions: one day before the beginning of the preseason preparation period and after 7 weeks of strenuous exercise.

**Results:** Analysis revealed a significant decrease in vWF Ag plasma levels among the non-smokers, at the end of the experimental period (p=0.018, 95% CI), suggesting a potential beneficial effect on the endothelium of these athletes. Furthermore, multivariate analysis showed that the combination of age > 29 years and smoking can significantly impair this effect (p=0.033).

**Conclusions:** Strenuous exercise did not lead to endothelium activation or dysfunction on well-trained non-smoking soccer players. On the contrary, it seemed to produce a beneficial effect on the endothelium of these players. This beneficial effect was moderated by the combination of age > 29 years and smoking.

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**10:30 - 12:00**

**S47 GENERAL PSYCHOLOGY - PART III**

**S47.1 Cognitive flexibility and tactical behavior of soccer players**

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*Centre of Research and Studies In Soccer, Universidade Federal de Viçosa, Brazil*

**Introduction:** Cognitive flexibility refers to the ability in adjust knowledge according task demands. This ability may influence different aspects in performance, among them, tactical component. The aim of this study is to compare the cognitive flexibility and tactical behavior between soccer players.

**Methods:** The sample comprised 100 U-15 youth soccer players. The instruments used to evaluate cognitive flexibility and tactical behavior were, respectively, the Wisconsin Card Sorting Test (WCST) and the System of Tactical Assessment in Soccer (FUT-SAT). FUT-SAT enables the evaluation of the ten core tactical principles of soccer game: (i) penetration; (ii) offensive coverage; (iii) depth mobility; (iv) width and length; (v) offensive unity; (vi) delay; (vii) defensive coverage; (viii) balance; (ix) concentration; and (x) defensive unity. To calculate the tactical behavior, the accuracy rate of the tactical actions in each principle performed by players was considered. To calculate cognitive flexibility, the number of categories completed by players in WCST was considered. Cognitive flexibility data was grouped in tertiles (low, moderate and high). Players from 'low' and 'high' tertiles had their values compared with respect to their tactical behavior.
Kolmogorov-Smirnov and Mann-Whitney tests (P<0.05) were performed through SPSS for Windows®.

Results: Statistically significant differences were observed between cognitive flexibility and tactical behavior of soccer players for the tactical principle of depth mobility (U=156.5; P=0.03). No statistically significant difference was found for any of the other tactical principles.

Conclusion: It is concluded that cognitive flexibility influenced tactical behavior, specially the principle of depth mobility.

Keywords: Soccer, Cognitive Flexibility, Tactics.

S47.2
Preventing athlete burnout among Japanese adolescent soccer players
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Athlete burnout is surrounded by strong connotations and is one of the most corrosive psychosocial syndromes faced by athletes. Although the field of burnout research is ever increasing, causal relationships between burnout and its antecedents still remain unclear. This study, therefore, adopted a prospective research design to investigate the associations between potential early signs measured at the beginning of the season and burnout dimensions measured at the end of the season among Japanese athletes. The sample comprised 144 collegiate male soccer players (M = 20.0 years, SD = 1.3) from Japan. The Japanese versions of two quantitative questionnaires were administered. The Athlete Burnout Questionnaire (ABQ) measured burnout dimensions, and the Potential Early Signs of athlete burnout (PES) measured five early signs: money hassles, sport-related hassles, social support, competence, and control items. General Linear Models were used to determine the effects of the early signs on the dependent variables. To gain a deeper understanding of the scoring patterns, the participants were categorised into three groups based on pre-specified cut-off points: burnout-free, burned-out, and those who were recovered. A number of athletes in this study continued competing in soccer by keeping their feelings and motivation for sports even while experiencing decreases in performance and losing their energy due to the physical and emotional demands. In addition, some significant relationships between early signs (perceived sports-related hassles, social support, competence, and control) and burnout dimensions were highlighted. These findings indicate the need for practitioners to consider ways in which they can prevent athlete burnout.

S47.3
Competitive balance in the MLS and new methods of analysis
Carlos Gómez González(1), JG Unanue(1,2), SR Cañamero(1), JLF Hernández(1,2), AF Luna(1,2), MS Mathew(1), J del Corral Cuervo(3), LG Guerrero(1)
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(2) European University of Madrid, Spain
(3) Faculty of Economics of The University of Castilla-La Mancha, Spain
Soccer has gained in importance in the US during recent years and its professional soccer league, the Major League Soccer (MLS), is gradually growing. Like other American leagues, in order to increase fan attention, the MLS has been designed to have a high level of competitive balance. However, the competitive balance of the MLS has not been studied in depth by the scientific community. Therefore, the aim of this study is to analyze the evolution of the competitive balance of the MLS through prospective (i.e., measures based on betting odds) and retrospective measures (i.e., the Herfindahl–Hirschman Index and concentration ratios). Betting odds is the axis around which the prospective method has revolved lately. This method shows fans perceptions about competitive balance and allows us to distinguish the specific characteristics of a competition that may result in a low or high degree of competitiveness through density functions. The retrospective measures will enable the comparison of the results to previous studies as well as the prospective measures’ results. The results show a good level of competitive balance of the MLS altogether and within its two conferences. Accordingly, the MLS has a higher level of competitiveness when compared with European leagues. Nevertheless, a decline in the competitive balance is observed over the studied period (2004–2013) especially in the last years. Finally, similarities were found in the competitive balance results after the comparison of prospective and retrospective indicators. However, the prospective measures seem more practical due to the additional information provided.

S47.4
Sources of strain; stress and coping in elite soccer performance schools
Amanda Wilding
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The elite soccer arena is like no other. No matter what the age of the player it's an environment which provides unique experiences for those competing at the top level of sport. Consequently, the mental ramifications of engagement in sport are commonly referred to as sources of strain. Despite an increased knowledge base surrounding sources of strain and their associated coping mechanisms, much of the present research focuses on senior athletes. The purpose of the current study was therefore to establish the sources of strain as experienced by performance school soccer players and to understand the players coping strategies for dealing with stress. A questionnaire consisting of five sections (background information, competitive stressors, organisational stressors, personal stressors and general questions) was administered to 102 participants from seven Scottish regions. All players had been in the performance school system for 6–7 months. Participants were asked on a scale of 1 (low stress) to 10 (high stress) to rate their level of stress and were asked what type of coping strategy they use deal with the stressors. Each region reported different stressors but self pressure, school and injuries were reoccurring issues. All three categories (competitive, organisational & personal) were represented as stressors. In relation to coping strategies participants evidenced a clear lack of understanding regarding what actually constituted a coping mechanism. Whilst pockets of high levels of stress existed, overall levels were low to moderate. Consequently players had a limited number of coping strategies which could buffer any increased level of stress.

S47.6
Grit in junior and senior professional football players

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Grit has been proposed to represent a tendency to pursue long-term, challenging goals with perseverance and passion. A related concept, self-control, has been defined as the capacity to alter one’s responses to achieve a desired outcome that otherwise would not arise naturally. Both concepts have been related to performance in several domains. Recent research has shown that self-control was associated with senior professional football players’ performance level. The current study investigated the concept of grit in professional footballers, and examined whether senior players of three professional clubs in the Norwegian Premier League (n = 55; mean age = 24.9 yrs.; SD=5.6) were grittier than their junior counterparts (n = 54; mean age = 16.9 yrs.; SD=1.1). Players completed the Grit-S, Brief Self-Control Scale, and questions related to the amount of effort they were willing to expend to reach certain short- and long-term goals. Grit in professional football players was found to be strongly related to self-control (r=.49 restraint, r=.56 impulse control). Additionally, grit scores were associated with the amount of effort players were willing to expend to win a duel within a game (r=.23), solve their task in a game (r=.22), become better at a skill they want to improve (r=.20), reach their individual goal for the season (r=.39), and reach their long-term career goal (r=.34). No significant differences were found between junior and senior footballers. Grit seems to be associated with professional players’ self-control and willingness to expend effort to reach short- and long-term performance goals in football.

10:30 - 12:00

S48 REFEREES AND SCOUTS

S48.1 Reputation of referee and opponents: is social information relevant when soccer players decide to use antisocial behaviours?

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The studies presented are part of a social cognition approach. The aim is to examine to what extent the soccer players use social information related to the reputation of the referee and the opponents to regulate their interactions, especially when they are in a defensive position, one against one. In such situations, use unsportsmanlike conduct may result in a favourable outcome. 3 studies based on hypothetical scenarios were conducted using a between subjects factorial design. Study 1 examined referee’s reputation effect (Severe/Lenient). Study 2 analysed the influence of the aggressive reputation of the opponent (Aggressive/No aggressive). And study 3 analysed the influence of the technical reputation of the opponent (Better/Worse than the player). for each study, the reputation was either confirmed or invalidated by situational social information. Information on the nature of the behaviour or the period of the game were also provided. Players were asked to indicate on a Likert 5-point scale to what extent they would use antisocial behaviour to obtain a
favourable outcome if they were faced with the same situation. The results show a significant effect on the reputation of referee and opponents, especially when reputation is confirmed by situational social information and when the situation occurs late in the game. The unsportsmanlike conduct appear rather as strategic actions determined not only by the personal characteristics of the perpetrator who implements them but also by social information about other people involved in interaction.

S48.2

In the beginning or at the end of their career? Young referees' conceptions of refereeing, training and career

Arto Nevala

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Dosseville, Laborde and Garncarzyk wrote (2011): “Sport officials are often judged, sometimes criticized, rarely forgotten, but regularly at the heart of stormy discussion.” In spite of this, referees have received little scientific attention until recent years. This is also the case in football, although football is not only the world’s most popular sport but also the most researched one. In the center of my presentation are young referees, who have just started their careers.

I will concentrate on four questions: what kind of impressions young referees had about refereeing; how do they evaluate referee training; how large is the so called drop-out phenomenon among young referees and, as a conclusion, what are the most important sectors to develop in referees’ recruitment and training? The key source is the survey made for all young referees passed their first course in the eastern part of Finland during the years 2013-2014. In addition, I have interviewed people responsible for referee recruitment and training in the Finnish FA. I use both quantitative and qualitative methods in analyzing the results of surveys and interviews. The preliminary findings seem to indicate that most of the young referees had a positive attitude towards refereeing and they were quite satisfied with their basic training. Even so, they would have needed more information about everyday practices. Furthermore, approximately half of the young referees did not continue refereeing for longer than two seasons. Because of this, more attention should be paid to integrating “rookies” with the subculture of refereeing.

S48.3

Soccer a jury sport? Or, the Influence of wrong referee decisions

Gerard Sierksma

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Since it has become a multi-billion industry, soccer has professionalized rapidly. With increasingly many top matches ending with not more than one goal, referee mistakes very often have a decisive influence on the outcome of the match, and, in many cases, the consequences of wrong referee decisions are viewed by the public as disproportionate. An iconic example is Thierry Henry's handball in 2009, thanks to which France made it to the FIFA World Cup, at the expense of
Northern Ireland. We summarize the crucial referee ‘mistakes’ during FIFA World Cup 2014 and position this problem in a broader framework, generalizing to other sports disciplines. In 1996, the Harvard evolutionary biologist Stephen Jay Gould formulated the following challenging hypothesis: Assuming that the rules of the game do not change, the number of the top performing participants increases over time, and these participants become progressively competitive. Increasing performance leads to leveling at the top, and extreme events become increasingly rare. We show how the Gould hypothesis is relevant in soccer, and propose a simple change of the rules that decreases the influence of referee mistakes, and hence increases the credibility of the sport. The talk is supported by various video clips, and concludes with a number of (research) questions.

S48.4

The role of sport agents in career planning for young soccer players
Lucas Silvestre Capalbo
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Many young soccer players have dreams to one day play in the big leagues, make fortunes, and be famous. But, in order to accomplish it, these youngsters need guidance and planning. Therefore, this study heard the opinion of youth players in order to a) identify their career goals and b) discuss the role of the Sport Agents in their career planning. This qualitative study used a semi-structured interview to assess 11 Brazilian soccer players ranging from ages 16 to 18. The data collected was analyzed and discussed employing the Speech Analysis Method in order to preserve the interviewees’ discourse. Results found that when asked about their future plans, most youngsters presented common general goals, such as playing for the first squad, serving the national team, and signing with a foreign club. Although our interviewees were still playing at academy level, they already counted on Sport Agents to take care of their professional careers. According to the players, the agents provided them with financial and emotional support, helped find endorsements, dealt with contracts, and followed up on their studies. Young soccer players demonstrated having ambitious goals, but all of them lacked having their agents assist with tailoring personal and realistic plans to achieve these goals. The absence of planning could be considered as one of the reasons that many players fail to progress to successive career stages. On the other hand, planning can foresee obstacles and help individuals take best care of their careers.

S48.5

The expected value of draft selections in professional Australian football
Courtney Sullivan, T Kempton, AJ Coutts
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Aim: This study determined the expected performance value of players in the Australian Football League (AFL) based on draft selection number.
Methods: Draft selection data from the 1990-2013 AFL seasons were analysed with the relationship to career success explored (number of career games played, Champion Data® rank and Brownlow votes). Draft selection data was delimited to include players recruited in the National Draft at selections 1-80 (n=1717). Selections were grouped into blocks of 5 for analysis. A one-way analysis
of variance for repeated measures was used to test the differences in career games played, Champion Data® rank and Brownlow votes between draft selections. The mean number of career games played, Champion Data® rank and Brownlow votes were determined for each draft selection.

Results: The mean (±SD) number of career games played by draft selections were 59±75. Mean Champion Data® rank for the season was 871±663 while mean Brownlow votes for the season were 5.5±5.3. Selections 1-5 played more career games and accumulated more Champion Data® rank points for the season than all other groups (p<0.01) with a similar trend demonstrated for Brownlow votes. Selections 1-5 played 2.02 times more career games than the average, accumulated 1.54 times more Champion Data® rank points and 1.21 times more Brownlow votes.

Conclusions: First round draft selections play more career games, accumulate more Champion Data® rank points and Brownlow votes than players recruited at lower selections. This expected point model has applications for informing decisions relating to player draft selections in professional AF.
P01.01  Counter-rotating vortex pair of a soccer ball in flight  
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The purpose of this study is to investigate the near-wake structure behind a soccer ball with little or no spin in actual flight using particle image velocimetry (PIV) analysis. The vortex structure of the wake flow of a soccer ball (32 panels) continuously changed and the ball was deflected from its path. This tendency was observed in all attempts. It was also observed that the separation point fluctuated at the boundary layer. A counter-rotating vortex pair was often observed in the wake flow of the ball, along with large-scale spin around the axis, defined by the direction of ball flight. Furthermore, the large-scale spin of the counter-rotating vortex pair caused the wake flow to deviate. However, the counter-rotating vortex pair was unstable because it often disappeared or was difficult to identify. The separation points and the vortex structure of the wake flow of the ball subtly changed over time, potentially causing the fluctuation of the side and lift forces. This observation may be one of the fundamental features of a vortex structure of a spherical object under a high-Reynolds flow. In many cases, a deflection occurs in the wake if the counter-rotating vortex pair is spun along the axis aligned with the direction of the movement of the ball, which may cause the fluctuations in the side and lift forces.

P01.02  Kinematics of ball stopping technique in soccer  
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The present study aimed to illustrate the kinematics of side-foot ball stopping in soccer. Six male university level soccer players were asked to perform the side-foot ball stopping technique to a fired air ball from a machine 10 m ahead. The fired ball velocity and trajectory were controlled throughout all trial. Five successful trials that the ball was stopped near the participant were selected from each subject for subsequent analysis. The ball stopping motion was captured using a 10-camera motion capture system sampled at 500 Hz. The change of the linear foot and ball velocities
were computed just before, during and just after ball contact. Six joint angles: the foot dorsal/plantar flexion, the knee flexion/extension, the knee internal/external rotation (including the foot adduction/abduction), the hip flexion/extension, the hip adduction/abduction and the hip internal/external rotation, were calculated. It can be seen that a gentle forward leg swing were followed by a distinct draw back the foot before ball contact. It can be assumed that the knee flexion and the hip internal rotation motions apparent just before ball contact were most likely responsible for the foot pullback motion. Also, a rapid knee external rotation motion was initiated just after ball contact. As this motion occurred after the foot contacted with the ball, it is reasonable to assume that the knee was passively external rotated. These kinematic aspects may represent significant motion features required for the side-foot ball stopping technique in soccer.

P01.03
Kinetic analysis of instep kick towards various directions
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(2) Fukuoka University, Fukuoka, Japan

The present study aimed to illustrate kinetic aspects of angled instep kick. Nine male soccer players performed maximum instep kicks towards three angled directions (15, 45 and 75 °rees). The kicking motions and ground reaction forces were recorded simultaneously by a motion capture system at 500 Hz, and then moments and angular velocities of the legs and pelvis were calculated. Although peak angular velocity of the pelvis counter clockwise rotation was systematically and significantly increased with the angle of the kicking direction, the magnitude of the hip moment on the support leg regarding that rotation did not have the kind of tendency. It can be assumed that the pelvis rotation was most likely induced by external force such as ground reaction force rather than muscles around the hip joint. Moreover, the larger kicking angle, the higher hip adduction moment on the kicking leg was indicated. And the magnitude of moment was significantly different between each condition while keeping a similar level of the hip adduction angular velocity. It is likely that to enhance of the hip adduction moment has a role to control the abduction angle within an optimal range against the centrifugal force produced in response to the kicking direction. In the support leg, the plantar flexion angular velocity varied between each condition regardless the magnitude of muscle moment for the motion. It can be assumed that difference of the ankle joint motion was exclusively influenced by the ground reaction force varied by kicking direction.

P01.04
Hip joint torque-reversal is not optimal in human kicking motions
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Kicking motions are executed in a proximal to distal sequential segment motion. Initially the thigh accelerates forward, causing a lagging behind of the shank-foot segment. This is followed by an acceleration of the shank-foot segment and a deceleration of the thigh segment. The purpose of such movements is to maximise the velocity of the foot, as this velocity determines the ball velocity.
Two strategies have been proposed; either continuing the activation of the hip flexors throughout the whole movement or to suddenly activate the hip extensor muscles in the latest part of the movement, a so-called torque reversal. In this study, the kicking leg was modelled as a system consisting of two segments, and the angular momentum was expressed before and after a hip-joint torque was applied. An analytical solution was obtained, that could express the change in velocity of the foot as a function of the hip joint torque. The results revealed that the velocity of the foot only increased if there was a hip flexor torque. Torque reversal always decreased the velocity of the foot. We conclude that torque reversal in human kicking motions is not optimal.

P01.05
Biomechanical characteristics of the long throw-in in soccer
Hironari Shinkai
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The long throw-in can create goal scoring opportunities equivalent to the free kick and corner kick in the attacking third. However, there has been no biomechanical study that reported the motion of long throw-in reaching around the goal. The aim of this study was to describe the characteristics of soccer long throw-in motion.

Fourteen experienced male soccer players participated in this study. Subjects were instructed to perform maximal long throw-in following a rule of soccer indoors. These motions were recorded by three high-speed video cameras sampling at 300 fps. To describe the motion characteristics of long thrower, the contribution of the joint motions in the upper body to the hand velocity was calculated. The average initial ball velocity, release angle, and distance were 15.1 ± 1.8 m/s, 31.9 ± 6.0 °, 20.3 ± 4.6 m, respectively. The average hand velocity just before ball release was 12.1 ± 1.4 m/s and this parameter has a strong correlation with ball velocity (r = 0.91). The distance of the longest thrower was 30.7 m and its hand velocity was 14.7 m/s. In the most of the subjects, the contribution of the shoulder motions to the increase of the hand velocity was large. In contrast, large hand velocity was produced by the elbow extension in the longest thrower. The shoulder of this player at the maximum backswing was more horizontally adducted, and this characteristic posture of the shoulder would be work effectively to the increase the hand velocity by elbow extension.

P01.06
A three-dimensional analysis of one-handed aerial soccer goalkeeper saves
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One handed saves can be ideal if the ball is out of reach for a two handed save, since they can provide a quicker reaction and can lead to longer reach, by using a combination of spinal lateral flexion and shoulder elevation (Smith & Shay, 2013). However, current coaching literature does not provide directions for what hand to use, or in what situation to actually perform this skill (Hughes, 1990). Previous work has identified the use of both Top Hand Technique and Bottom Hand Technique, yet there are concerns regarding diving to respectively preferred and non-preferred side. The study aimed to examine three-dimensional kinematics of a one-handed soccer goalkeeper dive to obtain a better understanding of when to use Top Hand Technique, or Bottom Hand Technique. Nine semi-professional goalkeepers performed saves of shots to both the right and left top corners
of a soccer goal that was reconstructed within the laboratory. Shots were fed from punt kicks to these areas at a minimum of 17ms-1 where goalkeepers were instructed to save the ball with one hand, whichever hand felt most natural following a game related movement prior to each save. Goalkeepers wore retroreflective markers to identify feet, arms, pelvis and torso and were tracked, in addition to the ball using a 10 camera Vicon T-Series system. Data provides coaching recommendations for when to use Top or Bottom Hand Technique dependent on the centre of mass velocity, reach distance, and relative trunk and pelvis rotation during diving one-handed saves.

P01.07
Dietary habits in elite soccer team
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Purpose: The nutritional intake of athletes is determinant of their athletic performance and ability to compete both physically and mentally. Athletes can meet 100% of their dietary needs from a well-balanced nutrition plan. The aim was assess dietary habits (DH) in elite male soccer players (EMSP).

Methods: 33 of Italian Serie A EMSP (age 26.4±4.3 yr, weight 81.0±7.5 kg, height 183.3±6.6 cm) were assessed in pre-season period.

We utilized nutritional intake assessment with interview, to ascertain what was consumed (weekly frequencies of food groups and frequency, type of supplements used) and dietary behaviors.

Results:
Frequency of weekly consumption of food shows that cereals and derivatives are consumed on average 9.4 ± 3.4 times a week, fresh meat 3.8 ± 1.9, preserved meats 1.8 ± 1.7, fish 2.0 ± 1.2, milk and yogurt 3.2 ± 3.9, cheese 2.9 ± 2.0, fresh fruit 11.2 ± 9.9, dried fruit 1.0 ± 1.5, vegetables 8.6 ± 4.4, legumes 1.1 ± 1.2, eggs 1.3 ± 1.3, confectionery 2.5 ± 1.8, sweetened drinks 1.1 ± 1.7 and alcohol 1.2 ± 1.5.

54.5 % (n=18) takes supplements habitually.

Conclusions: DH are incorrect: the assumption of carbohydrates were below respect to international guidelines and consumptions of fish, vegetables, fresh fruit and dried fruit is low.

Most EMSP of this team takes supplements: international guidelines suggested which it is important to have healthy DH rather than taking supplements.

Based on these results, a well designed nutrition intervention would be advisable for maintain health, important to performance in EMSP.

P01.08
Pre-season changes in anthropometric characteristics of elite inter-county Gaelic footballers
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At the elite level, team preparation and game demands of Gaelic football are comparable to other professional team sports. Nascent data suggest pre-season training regimes for players are
ineffective in achieving desirable changes in body composition. The current study aims to investigate changes in the anthropometric characteristics of elite Gaelic football players over a pre-season period. Skin-fold thickness (SFT), body mass (BM) and body fat percentage (BF%) were recorded in male inter-county Gaelic football (n=20) and hurling (n=18) players at the beginning and end of a ten week pre-season training phase. Hurling players were used as a control group. SFT was determined at 8 sites (bicep, tricep, sub-scapula, iliac crest, supra-spinale, abdomen, front thigh and medial calf) using Harpenden skin-fold callipers. Analysis of variance was used to determine changes over time and differences between Gaelic football and hurling players. There was no significant change in SFT, BM or BF% of the Gaelic football players between time points. Neither was there a significant difference in BM (GF: 84.0±9.2 kg, 84.8±9.5 kg H:, 81.9±7.7 kg, 82.4±6.7 kg), SFT (GF: 73.4±21.5 mm, 65.6±19.2 mm, and H: 76.2±27.6 mm, 68.2±19.0 mm) and BF% (GF: 10.6±1.6%, 10.2±1.5% and H: 11.3 ± 2.2%, 10.6 ± 1.7%) between Gaelic football and the hurling control group at both time points. The anthropometric characteristics of Gaelic footballers are relatively homogenous with little change observed over the pre-season. Anthropometric profiles compare favourably to other professional team sports. Future work should focus on improving individual scores in those with non-ideal SFT.

P02 CHILDREN

P02.01 Do young football players need to learn how to start the game (set-pieces)?
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The study of how to begin to teach sports and how to promote the teaching-learning processes in children has been a relevant research line in the Sport Sciences. There have been issues that have been made with more or less intensity and frequency. According to the revised literature not been previous studies on the performance of the game according to the moves starting set-pieces, or play in which the ball is already in motion in young football players. This is the study object, as it is important to know if they have to teach-learn these actions in a specific manner with the players, or if instead it is not necessary to perform this type of learning is explicitly. The players who participated in the study came from the Spanish second division team: 82 players were analyzed, these young players were selected from four training categories: 20 sub-9, 20 sub-11, 20 sub-13 and 22 sub-15 players. Used measuring instrument has been Game Performance Evaluation Tool, measuring the efficiency in the three attack tactical principles (keep the ball, progress towards the opposing goal and achieve the objective), decision-making and execution in the tactical actions of attack. The results provided by ANOVA and Bonferroni describe that there are significant differences in the performance of the two move types between under-10 and under-14 players. Seems to be the element key of set-pieces is the game without the ball, or the shake off efficacy. Which is relevant to strengthen the teaching or training process.
P02.02

Anthropometric, fitness and coaches’ perceptions of technical skill favour early maturing adolescent Australian footballers

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During mid-adolescence, biological maturity can vary greatly between athletes of similar chronological ages, resulting in early maturing athlete’s benefiting from greater anthropometric and fitness characteristics, when compared to their late maturing counterparts. In Australian Football, advantages associated with early maturation may also result in greater technical and perceived skill efficiency. The aim of this study was to examine the impact of maturational status on anthropometric and fitness testing, technical skill efficiency and coaches’ perceptions of skill in talented adolescent Australian Footballers (n=225, age 15.64 ± 0.29 years). An estimation of years from peak height velocity (Y-PHV) was used to class athletes as either late (Y-PHV below 1.16 years, n=44) average (Y-PHV between 1.17 and 2.15 years, n=138) or early (Y-PHV above 2.16 years, n=43) maturing individuals. Unsurprisingly, early maturing athletes where significantly taller, heavier and outperformed late maturing athletes in the sprint and vertical jump tests (p<0.05). No difference was found between maturational groups in the aerobic endurance test or for performance in the two skill efficiency tests. Coaches’ perceived early maturing athletes to have significantly better overall technical skills (p<0.05) when compared to late maturing athletes however, of the independent technical ratings only marking (p<0.05) showed significant difference between groups. Early maturing adolescent athletes are likely to be afforded significant competitive and selective advantages compared to their later maturing counterparts because of the combination of superior anthropometric, and fitness capacities, and greater perceived technical skill. This is despite early maturing athletes not demonstrating superior technical skills in tests used.

P02.03

Playing position characteristics of elite youth (13-18 years) soccer players in England

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Objectives: To investigate if playing position of elite youth soccer players is explained by relative age, maturation stage, anthropometric and physical fitness characteristics.

Methods: 468 (U13-U18’s) players from 15 soccer academies were categorised according to playing position: goalkeeper (GK, n = 47), central-defender (CD, n = 79), lateral-defender (LD, n = 81), central-midfield (CM, n = 117), lateral-midfielder (LM, n = 66), and forward (FWD, n = 78). Anthropometric (stature, body-mass) and physical-fitness (Multi-Stage Fitness Test [MSFT], T-test, 10 and 20m sprint, vertical counter-movement jump) measures were recorded during the 2013-14 soccer season, accompanied by players’ relative age, quantified as the number of days (DOBd) into
the selection year, and their estimated age at peak height velocity (aPHV) to assess somatic maturity status. General linear model analysis assessed the variation of these characteristics discriminated by playing position.

Results: LD were relatively younger than CD (P = 0.020, mean difference = 49 ± 16 days). GK and CD were taller than LD, CM and LM (P ≤ 0.010). Maturity related differences were present in U13-14’s, where LD, CM and LM had later aPHV versus GK (P ≤ 0.010) and CD (P ≤ 0.010).

Conclusion: Taller and relatively older players were selected for GK and CD roles that involve frequent physical duals and aerial contests, likely explained by their advanced maturation status and advanced relative age. Systematic monitoring of these characteristics may inform selection policy, so that transient body size advantages do not result in potentially erroneous and premature positional role allocations.

P02.04
The postural sway of center of gravity agitation in Japanese high school Rugby Union players

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Introduction: Our previous research reported on the measurement results of Postural Sway of Centre of Gravity Agitation (PSCGA), comparing Welsh and Japanese university rugby union players. The Welsh players measurement values’ for Length (LNG) with closed eyes and LNG of Romberg rate in the PSCGA were in fact lower than the Japanese players (P<0.05). The purpose of this study is to examine the measurement results of a PSCGA that compared Japanese rugby union players from T high schools (Division one) with those from K high schools (Division two).

Methods: The participants were seventy-four T high school students who played in Division one and forty-eight K high school students who played in Division two of the Japanese high school rugby union league. Players’ the PSCGA displacement was recorded for 30 seconds at the frequency of 50Hz, and LNG and Environment Area (ENV.A) were calculated using a portable gravicorder (GS-7, ANIMA, Tokyo, Japan) to determine the PSCGA.

Results: In terms of physique there appeared to be no significant difference between T and K high school students in height and body weight. However, the results indicated that T high school players measurement mean values for LNG (31.9cm) and ENV.A (1.3cm2) in the PSCGA were in fact lower than K high school players (P<0.01).

Conclusion: It can be concluded that T players were superior to the K players in terms of balance in the PSCGA. Keywords: PSCGA, Japanese high school rugby union players

P02.05
Relationships between physical fitness and birth distribution on elite Japanese soccer players aged 13-17 years
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In the players’ selections, it was reported that the number of players born in the first three months tend to be large compared with the player born in other months. However, there are little researches concerning the birth month for the player who belongs to Japan Professional Football League. This study was designed to examine the relationship between physical fitness and birth distribution on elite Japanese soccer players aged 13-17 years. The subjects were one thousand five hundred seventy two players belongs to a professional soccer club in Japan. Their date of birth were divided into four periods of the year: April to June, July to September, October to December, January to March. Measurement items were height and weight as physique. Three items were measured to represent players' ability: 30m sprint time, Counter Movement Jump and YO-YO Intermittent Recovery Test Level 2. The date of birth distribution of professional soccer players in this study were seen distinctive trend. The highest proportion of players was between April and June (U-13; 47%, U-14; 47%, U-15; 44%, U-16; 45%, U-17; 46%), and the lowest proportion was between January and March(U-13; 8%, U-14; 8%, U-15; 9%, U-16; 9%, U-17; 8%). In particular, those player born in the first three months between April and June were superior to the players in the last three months for the height, weight, 30m sprint time and jump ability. It was suggested that high relevance is between physical fitness and birth distribution on elite Japanese soccer players aged 13-17 years.

P02.06
Talent identification of young players in the context of a professional soccer club
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Introduction: This study aimed to determine the characteristics of young players who are selected to play in a professional soccer club to better understand the talent identification processes around puberty.

Methods: Participants were the newly incorporated players (NP, n=14) and players who were already in the club (CP, n=65) in the U12 (N=42) and the U13 (n=37) teams. Anthropometry, performance (15m flat sprint, Barrow's agility test, Yo-Yo intermittent recovery test (level 1), counter-movement jump test and hand-dynamometry), chronological age and maturity-offset were compared between NP and CP, using Student's T test or Mann-Whitney U test.

Results: Differences were observed only in the U13 team. NP were taller (173.25±5.70 vs. 162.13±7.08 cm, p<0.05), heavier (63.40±4.10 vs. 50.03±7.41 kg, p<0.05), and had more fat, particularly in the trunk (31.70±3.82 vs. 19.88±7.49mm, p<0.05). Moreover, they performed better in the velocity (6.83±0.19 vs. 6.40±0.30m/s, p<0.01), jump (41.06±3.33 vs. 37±4.21cm, p<0.05)
and hand-dynamometry (38±5.16 vs. 30.20±5.42kp, p<0.05) tests; but worse in the agility test (2.15±0.06 vs. 2.22±0.09m/s, p<0.05). Besides, they were older and more mature.

Discussion: Thus, differences were only observed in the team closest to puberty. NP players had better performances in power and strength related tests, which together with a larger body size are probably related to the advanced age and maturity. Therefore, age and maturity remain two important characteristics in the identification of high level young soccer players. In contrast, agility may be related to the player's experience. Acknowledgements: This study was supported by a grant from the Basque Government (IT700-13).

P02.07
Investigating the factors that affect sprint performance of young soccer players
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The purpose of this study is to identify factors that affect the sprint performance as one of the most important motor skills decisive in the result of the soccer game. A total of 147 healthy young soccer players, playing in the youth teams of professional soccer clubs in Ankara, with a age range of 11.60±1.66 (years), soccer age range of 1.11±1.5 (years), height range of 143.28±11.85 (cm), body weight range of 37.17±10.29 (kg) and body mass index (BMI) range of 17.67±2.85 (kg/m²) voluntarily participated in this research. To identify certain physical features, athletes consecutively, body weight and height measurements, sprint tests (5m, 10m, 20m, 30m), flexibility test, push-up test, shuttle test, standing long jump test, and ball distance throwing test.
The SPSS 15.0 package software was used for the statistical analysis of the data. for all parameters, arithmetic means and standard deviations were calculated. The Pearson Correlation Test was applied to investigate the correlation between data. The study has revealed that sprint performance has a negative correlation with age, soccer age, height, weight, body mass index, long jump, push-up, sit-up, ball distance throwing, rope jumping and flexibility, and positive correlation with stamina. Considering the descriptive characteristics of athletes, it is observed that sprint performance increases with the increases in accordance with age, soccer age, height and body weight, and increases due to the decrease in body mass index. Studying the correlation between the motor skills of players and sprint reveals that sprint speed increases in accordance with the increase in long jump distance, number of push-ups, number of sit-ups, ball throwing distance and "ree of flexibility. As a result of the research, it is observed that speed as a crucial factor in soccer has close correlation with motor and physical skills. It may be argued that, higher emphasis should be placed on the speed skill while defining criteria for talent selection.
Keywords: Soccer, sprint, physical tests

P02.08
Somatic maturation and physical performance in young soccer players
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Objective: To compare the somatic maturation and its relationship with the physical performance of young soccer players. Sample: The sample included 105 subjects, 11 to 17 years old, belonging to a football club in the state of São Paulo. The subjects of this study were divided into three groups: group of subjects classified as before the peak, velocity during the peak, and after the peak. Methods: The evaluations consisted of physical fitness test vertical jump: Squat Jump e Countermovement Jump, speed of 10 meters and test Yoyo Intermittent Recovery Level 1. for inferential analysis, we used the ANOVA (one Way) and to determine differences between groups used the post hoc Tukey test was employed, with significance level p<0.05. Results: The results showed significant differences between peak in the vertical jump to SJ (F=5.51, p<0.01) and CMJ (F=5.01, p<0.01), the adjusted maximum oxygen consumption (F=4.18, p<0.05). Conclusion: There was a tendency for differences in the behavior of the performance of the explosive strength and maximal oxygen consumption adjusted for body mass at peak growth velocity of young soccer players.

P03 FATIGUE

P03.01 Alterations in secretory immunoglobulin. A pre and post professional Australian Rules Football matches
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Objectives: To (1) assess time-course trends in salivary Immunoglobulin A concentration ([s-IgA]) between pre- and post-match, across three AFL matches, and (2) determine if exercise workloads during AFL match-play effected trends in post-match [s-IgA].
Methods: Eleven professional AFL athletes (21.8 ± 2.4 years, 186.9 ± 7.9 cm, 87.4 ± 7.5 kg) had [s-IgA] measured, using a lateral flow immunoassay, at six time points, including 24 h and 1 h pre-match, and 1 h, 12 h, 36 h, and 60 h post-match, across three AFL matches. The present study Global Positioning Systems (GPS) with integrated tri-axial accelerometers during match-play to measure exercise workloads (player load). Player load (AU) is a measure of total aggregate accelerations that occur during movements in three vectors. Hypothesis testing was conducted for time dependant changes in [s-IgA] and player load using a repeated measures ANOVA.
Results: Player load from match three (1266 ± 124.6 AU) was significantly (p < 0.05) greater than in matches one (1096 ± 115.1 AU) and two (1082 ± 90.4 AU). Across match three, [s-IgA] was significantly (p < 0.05) supressed at two post-match measures (12 h and 36 h) compared to pre-match measures (24 h and 1 h).
Conclusion: Our findings substantiate that an increase in physiological demands during AFL matches may lead to suppression of [s-IgA] lasting for 36 h post-match. Longitudinal monitoring of the exercise workloads during AFL match-play and immunological response of s-IgA within 36 h of match-play for AFL athletes may augment fatigue monitoring strategies.

P03.02
Post-match fatigue kinetic of professional and young soccer players during competitive period
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Objectives: The aim of the present study was to analyse post-match fatigue kinetic of professional and young soccer players during the competition period.

Methods: Resting heart rate (HRrest), post-effort recovery heart rate (HRrecovery), rate of perceived exertion fatigue (RPEf), muscle soreness and blood samples with creatine kinase (CK) and resting lactate (La) were obtained in nine professional soccer players immediately before, 24h and 48h after two officials French first league matches (Ligue 1) whereas RPEf, HRrest and 20m speed performance (speed-20m) were obtained in ten U17 elite players immediately before, 24h and 48h after a friendly match.

Results: for professionals, a soccer match elevated all physiological markers until 24h (p<0.05); only HRrecovery remained significantly different 48h after the match (p<0.05) whereas there was no variation of HRrest, RPEf and speed-20m elevated until 24h and got back to reference values 48h after the match (p<0.05) for the U17 players. Comparing the two groups, HRrest remained smaller at all time for pros, and RPEf was lower for U17, 24 hours after the match (p<0.05).

Conclusions: In conclusion, soccer players, independently of their level, would need 48h to recover from a match. Professionals would get more tired after a match than young players but would recover as fast. Thus, they would recover more efficiently, especially thanks to a better fitness condition. Such results would help high level soccer and fitness coaches for managing weekly training load according to the match.

P03.03
Parasympathetic activity and perception’s data responses following a cold water immersion session and a whole body cryostimulation
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Purpose: This study compared the effects of whole body cryotherapy (WBC) and cold water immersion (CWI) on post-exercise recovery.
Methods: Nineteen football players performed three 4-minute recoveries (WBC, CWI or passive rest) 30 minutes after 90-minute training sessions in their usual conditions. We measured training load, squat jump performance (SJ), tympanic temperature (TT), blood pressure (BP), heart rate (HR), HR variability (HRV) indices, rate of perceived exertion (RPE), delayed onset of muscle soreness (DOMS), and thermal and comfort sensations (TS and CS). Data were collected before training (SJ), post-training (TT, HR, BP, RPE, DOMS), post-recovery at 5 min and 20 min (TT, HR, BP, HRV, RPE, DOMS, TherSen, ComSen) and the following morning (HRV, SJ). R-R intervals (rMSSD, pNN50 and HF) were used to evaluate autonomic nervous system modulation post-exercise and after a night’s sleep.

Results: rMSSD increased significantly after WBC. pNN50 showed a significant difference 5 min after WBC compared with CWI and passive rest. for WBC, CWI and passive rest, pNN50 indicated a significant increase between 5 min and 14 hours post-recovery. HF was significantly increased at 5 min post-recovery with WBC compared with CWI and passive rest. Also, the difference in HF between 5 min and 14 hours post-recovery was significantly higher with WBC than the two other recoveries. WBC stimulated cardiac parasympathetic reactivation and improved comfort sensations. WBC and CWI decreased heart rate and perceived muscle pain more than passive rest.

P03.04
Warm-up or cool-down? The effect of timing of an ankle injury prevention program in elite male soccer players

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Background: The epidemiology and aetiology of ankle injuries have been well considered, with fatigue identified as a risk factor.
Objective: To contrast temporal implementation of a field-based injury prevention program.
Method: Twelve elite male soccer players completed a six week field-based prehabilitation program, comprising a battery of lower limb functional movements. Players performed this intervention as either part of their warm-up (WU) or cool down (CD). Pre- and post-intervention, players completed the SAFT90 match-play simulation, with measures of postural sway and balance using the Biodex Stability System (BSS) and Star Excursion Balance Test (SEBT) before SAFT (T0), at half-time (T45) and full-time (T105). GPS-mounted tri-axial load was quantified throughout the SAFT90.

Results: Both WU and CD groups demonstrated significant ( P = .01) post-intervention improvements in BSS measures of Overall (OSI) and Medio-Lateral Stability Indices (ML). Post-intervention improvements were also observed in SEBT excursions in the Anterior (AD) (P = .02), Posterior Lateral (PLD) and Posterior Medial (PMD) (P = <.01) directions. Accumulated body load during SAFT90 was significantly (P = .02) reduced post intervention, attributed primarily to a reduction in Medio-Lateral load (P = .05). No significant Trial x Group interactions were observed for all variables measured (P ≥ .21).

Conclusion: The prehabilitation program had a positive effect on the mechanical load exhibited during simulated match-play and markers of ankle injury risk. However, no beneficial effect was
observed between WU and CD, indicating ankle prehabilitation can be performed pre- or post-training.

**P03.05**
The physiological and biomechanical response to a simulated period of short-term fixture congestion

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Congested activity schedules are common in soccer, with implications for impaired performance and increased injury risk. The aim of this study was to assess the physiological and biomechanical response associated with repeated soccer-specific activity. Ten male semi-professional soccer players (Age = 25.60 ± 3.78 years; \( \text{Vo}_{2\text{max}} = 56.16 \pm 5.82 \text{ml·kg·min}^{-1} \); maximum heart rate = 193 ± 8 beats·min\(^{-1}\)) completed three repetitions of a treadmill-based match simulation, with 48 hours between trials. A repeated measures general linear model revealed significant main effects for time \((P < 0.001)\) for RPE, heart rate, oxygen consumption, and blood lactate concentrations. There was however, no main effect for trial, and no trial x time interaction. Perception of muscle soreness and biomechanical measures associated with hamstring electromyography (EMG) and isokinetic dynamometry (IKD), and GPS mounted tri-axial accelerometry identified significant main effects for time \((P < 0.05)\). Perception of muscle soreness and peak knee flexor torque at 60 and 300 degs·s\(^{-1}\) identified a latent failure to recover between trials \((P < 0.02)\). Significant trial x time interactions were observed for mean EMG at 15 and 25km·hr\(^{-1}\). The current study has implications for the aetiological risks associated with periods of short term fixture congestion and the development of recovery strategies. The interaction of muscular response to soccer-specific activity, the subsequent reduction in muscular strength, and the perception of muscular soreness suggest a biomechanical (as opposed to physiological) focus in recovery.

**P03.06**
The influence of fatigue on the external:internal training load ratios in soccer

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In fully rested players, the use of external:internal training load (TL) ratios have shown large relationships with measures of fitness. However players may not always be in a rested state due to training and match-play commitments. Therefore this study aimed to examine the TL ratios in rested and fatigued conditions. 10 university-level soccer players underwent a lactate threshold test from which internal TL (iTTRIMP) was calculated. Players performed a 90 minute soccer simulation (BEAST90mod) on two occasions separated by 48h, during which heart rate and external load metrics were collected using a MEMS device (5Hz GPS, 100Hz Accelerometer). Measures of external TL [total distance (TD); high-intensity distance (HID); PlayerLoad (PL); mean metabolic
power (MMP); distance at high metabolic power (HMP) and iTRIMP were used to calculate the external:internal TL ratios. There were non-significant trivial to small decreases in TD (p=0.17; ES=0.32), PL (p=0.43; ES=0.37), MMP (p=0.98 Es=0.008) and HMP (p=0.13; ES=0.48) from simulation 1 to 2, whereas a moderate decrease was observed for HID (p=0.01; ES: 0.63). There were small to moderate significant increases across the two simulations for TD:iTRIMP (p<0.01; ES: 0.69), PL:iTRIMP (p=0.04; ES: 0.55), and MMP:iTRIMP (p<0.01; ES: 0.70). The changes in HMP:iTRIMP (p=0.40; ES: 0.21) and HID:iTRIMP (p=0.79; ES: 0.07) were small and trivial. The results suggest that certain external:internal ratios (TD:iTRIMP; PL:iTRIMP; MMP:iTRIMP) could be used for the detection of fatigue, especially where external load alone does not change or when high variation in HID measurement makes meaningful inferences difficult.

P03.07
Time-motion patterns and neuromuscular fatigue influences on technical performance in futsal players
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Intermittent intense efforts as occurring in futsal cause neuromuscular fatigue development. It is not clear if the development of fatigue affects technical performance. The aim of the present study was to investigate if the technical performance during simulated game of futsal would be affected by fatigue development. Nine professional futsal players participated in simulated games. The physical performance parameters, distance covered (DC), peak velocity (VP), mean velocity (VM) and number of sprints (NS) were calculated from video recordings. The technical performance parameters, number of finishing kicks (FKN), passes (PN) and tackles (TKN) was determined. Neuromuscular fatigue was determined before and after the game, by maximal isometric voluntary contraction of the quadriceps. Peak force (FP) and twitch interpolation parameters (femoral nerve supramaximal electrical stimulation – double pulse 1msX10ms, 200V, 121±15.56mA) resting twitch control (TC) and percentage of voluntary activation (%VA) was determined. Comparing the first to the second half of the simulated game, DC (1983.99±78.47vs.1861.65±136.23m, P<0.05) and VM (6.12±0.24vs.5.74±0.42km.h-1, P<0.05) decreased. Moreover, FP was reduced (818.3±168.1vs.695.1±289.7N, P<0.05) and %VA was lower (77.64±15.04vs.65.15±20.0%, P<0.05). TC was not statistically altered. Regarding technical skill performance, only PN was reduced (38.7±10.3vs.27.6±12.32a.u., P<0.05). It was evident that fatigue developed during futsal. The reduction in FP was associated with development of central fatigue as evidenced by reduced %VA. The unchanged TC indicates that peripheral fatigue was not evident. Thus, it appears possible the fatigue induced deterioration of technical performance is related the events in the central nervous system.
P03.08
The effect of maximal aerobic speed test and soccer match on mucosal immune system and Epstein-Barr virus (EBV) in collegiate soccer players

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It is well known that mucosal immunity plays an important role against microorganism or viruses causing Upper respiratory symptoms (URS). URS often appear as either primary invasion of pathogenic organisms and/or reactivation of latent viruses, such as Epstein-Barr virus (EBV). So far, many studies have been reported about mucosal immunity of soccer players, but there are few available data on EBV in soccer players. Thus, the purpose of this study was to examine the effect of maximum aerobic speed test (MAST) and actual soccer match on mucosal immune system and Epstein-Barr virus (EBV) in collegiate soccer players. We evaluated EBV-DNA expression in saliva, as well as secretory immunoglobulin A (SIgA) levels before and after both MAST and actual soccer match. We also measured game activities using GPS device during the match. The result of present study suggested that the changes in mucosal immunity and reactivation EBV levels after MAST and actual soccer match were different among individual. While, high intensity running of 2nd half was significantly decline that of 1st half, as well as total distance covered. However, further studies are required, the results of our study indicated the possibility that monitoring mucosal immunity and/or reactivation EBV levels may clue to the risk of URS in collegiate soccer players.

P03.09
Accelerometer for measurement intensity training in youth football players: a help in the formative process to the elite

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In soccer, the players perform intermittent work and there are a lot of devices to control it. We know that players performing low-intensity activities for more than 70% of the game, and moderate or vigorous activities for the other 30%. In this way the purpose of this study was to determine the intensity activity within 1-week seasonal training to establish a good lines of work in the process to make better games and tasks close to the real game but with controlling the fatigue. Twenty two U-19 soccer players (17 – 18 years old), from an elite club wore an accelerometer and data were recorded every one second during a seasonal training week. The control of movement, but also a 10-Rate of Perceived Exertion, and hours and sleep quality were collected to control the intensity and the rest of the players. The results show how the days of greater intensity of movement and fatigue were Wednesday and Thursday, while less were Monday and Saturday, as we had planned. This finding suggest that accelerometers combined with a RPE could be a good combination to manage fatigue and intensity of training in football, but also a good and easy way to facilitate the work of coaches in the design of upcoming tasks to the real game, controlling the workload.
Fatigue effect on the speed and accuracy among professional football players

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Introduction: acute-fatigue (AF) seems to be a deleterious factor for the quality of the game among football players. Objective: To evaluate the AF effects induced on organisms and their influence on the precision in 2 groups: professional and amateur.

Method: The TIPS-FIFA test consists of 2 sets of 3 sprints of 35m with changes of direction and a 25s recovery per pass, with a 1 minute recovery between 2 series. Reaction-time, speed without ball-driving, speed with ball-driving, precision and information collection were measured throughout the circuit. The ratio between the number of error vs speed and fatigue-index ratio were evaluated. The heart rate was recorded continuously; lactate was taken at rest and every 3 minutes after the end of each test.

Results: Among all the players, the comparison between the average-time of the first 2 passages and the ones of 5th and 6th passages show an increase: in reaction-time (p<0.05), in the ratio between the number of inaccuracies vs. the total time (20%), in ball-driving speed (p<0.05), in total errors (p<0.05), in the fatigue index (p<0.05) and errors in information gathering (p<0.05). On the other hand, no significant difference was observed between sprints without the ball. The heart-rate and the blood-lactate were higher at rest (p<0.05) but not during the races.

Conclusion: Exhaustion shows a deleterious effect on the reaction-time, on the ball driving-speed, on the information collection and the accuracy among all the subjects. However, a significant resistance to this deleterious effect was observed among the professionals (p<0.05).

Intermittent performance test specific to football

The TIPS-FB test is performed in 2 sets of 3 sprints:
The first portion 10m is made without ball.
The 2nd part of 10 m is achieved without ball, but with changing directions.
The third part is a ball driving speed.
The last part is an acceleration zone before reaching the goal.
P04.02 Action of the injury prevention check sheet and preventive programs for junior high school soccer players
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Purpose: We prepared an injury prevention check sheet called "Best 11 for soccer players". The check sheet was composed of 11 evaluation items, which were useful to injury prevention. We investigated this sheet for junior high school soccer players and instructed them the preventive programs.

Subjects and Methods: Subjects were healthy 18 junior high school soccer players. We categorized the 11 items into 3 groups. The 3 groups were composed of muscular flexibility 6 items, balance 2 items and cooperation 3 items respectively. We defined the items that did not meet the required conditions as a positive, and calculated the average of the positive rate of all items in each group. In addition, we instructed stretching and exercise guidance for them according to the programs. Furthermore, we gave explained to leaders, players and parents before starting this study. Moreover, we examined this study after obtaining informed consent.

Results: The average of the positive rate in each group was given as follows. The rate of muscular flexibility group was 46 ± 24%, balance group was 45 ± 26% and cooperation group was 34 ± 23% respectively.

Conclusion: Most items in this sheet were reported that the association with the injury was high. In this study, even the players who did not have the injury carried a high rate of positive. In the future,
we will evaluate the usefulness of this sheet and program by advancing longitudinal and cross-sectional study.

**P04.03**  
**Risk assessment of shoulder injuries using preseason muscle strength test in collegiate Rugby Union players**

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The purpose of this study was to examine cut-off value of muscle strength test for risk assessment of shoulder injuries in collegiate rugby union players. This prospective cohort study initially registered 28 rugby union players from one university club. Players with a history of shoulder surgery or histories of shoulder injuries were excluded from the study. All players participated in the preseason muscle strength test of shoulder joints, including 1RM bench press, 1RM shoulder press, internal rotational isometric muscle strength [IR], external rotational isometric muscle strength [ER], and abductor isometric muscle strength [ABD]. The occurrence of shoulder injuries was recorded during the 2011-2012 playing seasons. Shoulder dislocation/instability or rotator cuff injuries were included as injuries. This study was designed to consider only time-loss injury. The cut-off value to muscle strength test was determined by receiver operating characteristic (ROC) curve analysis. Seven players sustained shoulder injuries during the seasons. All muscle strength tests were significantly lower in injured players (n=7) compared with no injured players (n=21) (p<0.05). Cut-off value of preseason muscle strength tests were as follows: bench press=1.20 kg/body mass (AUC, 0.67: Sensitivity, 71.4%; Specificity, 61.9%), shoulder press=0.70 kg/body mass (AUC, 0.69: Sensitivity, 51.7%; Specificity, 81.0%), IR=2.80 N/body mass (AUC, 0.64: Sensitivity, 92.9%; Specificity, 35.7%), ER=2.60 N/body mass (AUC, 0.62: Sensitivity, 85.7%; Specificity, 38.1%), ABD=1.60 N/body mass (AUC, 0.69: Sensitivity, 85.7%; Specificity, 52.4%). This study suggested the cut-off value of muscle strength test is potentially useful in risk assessment of shoulder injuries in collegiate rugby union players.

**P04.04**  
**Relationship between the ability of dynamic balance and muscular flexibility for junior high school soccer players**

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Purpose: The purpose of this study is examining relationship between the ability of dynamic balance and muscular flexibility for junior high school soccer players.
Subjects and Methods: Subjects were healthy 18 junior high school soccer players. We used "Star Excursion Balance Test (SEBT)" as an ability of dynamic balance index and measured 8 directions, 9 items. Test of muscular flexibility was 6 items as follow: 4 muscles (iliopsoas muscle, hip adductor muscles, hip external rotation muscles, quadriceps muscle), Finger Floor Distance and deep squatting. We defined failure of the items as a positive. We examined the relationship between SEBT 9 items and muscular flexibility 6 items using of Chi-squared test (p-value 5%).

Results: As for Right-leg stance of SEBT, the significant relationship was between posterior and left iliopsoas muscle (p < 0.05). As for Left-leg stance, the significant relationships were between anteromedial and bilateral hip adductor muscles, anterior/posterior and bilateral hip external rotation muscles, posteromedial/posterolateral and deep squatting, posteromedial and left quadriceps muscle (p < 0.05).

Conclusion: In this study, the ability of dynamic balance more related to muscular flexibility. It was suggested that improvement of muscular flexibility is important because fine the ability of dynamic balance is associated with high performance and decreasing injury accidents. In the future, it is necessary to assess individual alignment and muscular strength during dynamic balance test to clarify more relationship between the ability of dynamic balance and muscular flexibility.

P04.05
Running performance during recreational soccer match in Japanese senior players aged Over-60 yrs

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Older individuals tend to play soccer for the recreational purpose rather than the competitive motivations. Regardless of the aims of the play, the soccer is expected to include the severe physical stress such as the high intensity intermittent exercise. The purpose of this study was to characterize the running performance during the recreational soccer games in older players aged Over-60 yr. Thirty-two senior soccer players (age; 64.3 ± 3.0 years) participated in this study. Subjects played 20-min half soccer game on an official-sized pitch. Running performance was assessed by a semi-automatic tracking system using a particle filter (Iseyama et al., 2014). The locomotion categories were as follows; standing (0-2km/h), walking (2-7 km/h), low-speed running (LSR, 9-13 km/h), moderate-speed running (MSR, 13-16 km/h), high-speed running (HSR, 16-22 km/h), and sprinting (>22 km/h). As results, the total distance covered was 4461 ± 314 m in 40 min., and it significantly decreased from the 1st half to the 2nd half (2309 ± 244 m to 2151 ± 385 m, p<0.05). Additionally, in regard to the playing time, both of the total distance in possession and that in non-possession significantly decreased at the 2nd half (p<0.05). Percentages of standing, walking, LSR, MSR, HSR, and sprinting during the game were 2.0%, 38.6%, 12.5%, 20.3%, 10.7%, 10.3%, and 5.8%, respectively. In conclusion, the running performance during the recreational soccer game
included the high intensity running in older soccer players aged Over-60 yr., which is the same as younger competitive players.

P04.06  
Recreational football for employees  
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Purpose: To examine the training intensity and health effects of a 12-week intervention with recreational football on small pitches for employees with various degrees of football experience aged 20-55 years under Danish Federation for Company Sport in Fredericia, Denmark.  
Method: A total of 19 employees, 14 women and 5 men, completed the intervention. Heart rates during the training sessions were measured using the Polar Team 2-system. Before and after the training period, the participants had resting heart rate measured along with their fitness level (Yo-Yo IE1), their 1- and 2-legged balance (flamingo test) and total fat percentage (skinfold caliper).  
Results: Heart rate during the training sessions at 4v4 and 5v5, respectively, were 85 and 86% of maximum heart rate. After the training period, the participants had an increase in Yo-Yo IE1 of 19±3% from 1411±206 to 1731±253 meters. The fat percentage was reduced by 1.0 fat percentage point (33.7±1.8% to 32.7±1.6%). Number of falls were reduced by 3.8 falls (1-leg: 21.3±2.4 to 17.5±1.9) and 3.1 falls (2-legs: 13.9±1.5 to 10.8±1.2). Resting heart rate was unchanged (64.0±2.4 vs. 60.1±1.7 beats/min) but tended to be lower (p=0.09) after the training period.  
Conclusion: The present study shows that recreational football at workplaces can provide the same intensity and some of the same positive effects on fitness and health parameters, which are seen in randomized controlled football studies for untrained men and women.

P04.07  
Risk heat-related illnesses and environmental conditions of soccer trainings in Ceará State, Brazil  
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This study aims to analyze the environmental conditions of soccer trainings in Ceará state, Brazil; and to check the risk that athletes might experience considering heat-related illnesses. It was verified the relative moisture, wind speed, and the Wet Bulb Globe Thermometer Index. To verify the risk, it was used the Protection Athlete Score Related to Heat. In the analyzed cities, the air temperature presented values of 30.2±3.4°C, on average. It was found significant differences (p<0.001) in air temperature between the climatic types. Relative humidity average was 55.6 + 17.5% with a minimum of 32% and a maximum of 88.7%. Significant differences were found
between the wet and dry climates (p<0.001). The Protection Athlete Score Related to Heat showed that the soccer practices in these environmental conditions presents moderate risk (40.2%), low (34.6%), high (23.5%) non-existent risk (0.6%) and very high risk (1.1%) to the athletes. The very high risk occurred only in cities with semi-arid climate, while the high risk was prevalent in warm tropical sub-humid climates (42.9%) and semi-arid mild (33.3%). Moderate risk occurred more often in cities with hot and humid tropical (40.3%) and semi-arid climate (23.6%). So, it is possible to conclude that the soccer trainings that occur in hot and dry or moderately hot and humid climates have a higher risk.

**P04.08**

**Correlation between physical condition and mistakes made by football players**

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In modern football, a team conceded or loses caused by some errors and mistakes made by their players instead of the quality of the opponent. The mistakes frequently happen from poor physical condition. We size up that physical condition is very important towards errors and mistakes measuring level for football team. We are using Hydration level as benchmark for their physical condition. Therefore, we did a research at Indonesia National U19 Team whether the hydration level affect their errors & mistakes level which is the hydration level as a variable represent a physical condition. We measure the hydration level every half time, and then, we create the correlation analysis of hydration level into errors & mistakes level of the players in 15 minutes each of half time. We got the coefficient Pearson correlation in the amount of -0.76 for these two variables. That amount approaching -1 which is there is inverted correlation between hydration level and errors & mistake level. The higher of hydration level of player, fewer mistakes are made and vice versa. This analysis can be used as a basis for claiming that the physical conditions affect the errors level players in the field. Weaker physical condition, then the lower of hydration so that more mistakes are made. Hence, it is important for team to build and maintain the physical condition their player since youth in order not to concede in the last minutes of the game just because of the unforced errors.

**P04.9**

**Training experience in soccer and bone health among young adult males: comparison between soccer players and non-athletes**

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Objectives: Sports is a main form of physical activity in young people. Osteoporosis is an increasingly important concern and beneficial effects of regular physical activity on bone health
parameters are well documented [1]. Training experience during the first decades of life may be crucial for future bone health [2]. Cross-sectional studies consistently supported the association of impact activities with bone mineral content (BMC) and density (BMD) [3;4;5]. This study aimed to examine the relationships between experience in competitive soccer and bone health parameters in young adult males.

Methods: Soccer players (n=31; 23.37±2.91 yrs; 178.9±6.2 cm; 75.6±6.5 kg) and non-athletes (n=35; 21.71±2.48 yrs; 175.1±5.2 cm; 73.8±13.6 kg) were assessed in bone areas, bone mineral content (BMC) and derived bone mineral density (BMD) for the whole body and at particular regions of interest using dual-energy x-ray absorptiometry (DXA).

Results: Differences between means of the groups were moderate for stature (d=0.67) and fat tissue (d=0.74), trivial for body mass (d=0.17). Magnitude effects for the whole body analyses were large for total body BMC (d=1.61) and BMD (d=1.55). Regarding spine (L1-L4), the difference between means corresponded to large magnitude effect for BMC (d=1.64) and for BMD (d=1.76). Additionally, effect size was small for the BMC regarding upper limbs (d=0.24), and moderate for BMD (d=0.85). As for lower limbs, magnitude effect was large for BMC (d=0.40) and very large for BMD (d=2.04).

Conclusions: The impact of physical activities and experience in competitive soccer are relevant contributors to mineral acquisition and seemed essential to bone health.

P05 VARIA - FATIGUE, MATCH ANALYSIS & INJURIES

P05.01
The association between components of training and match workload and hamstring strength asymmetry

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Objectives: Large week-to-week in-season change in bilateral isometric strength hamstring asymmetry has previously been identified as a potential risk factor for hamstring strain in professional Australian Rules footballers. The aim of the present study was to evaluate the association between the volume of components of training and match workload across a week of and the change in bilateral isometric hamstring strength asymmetry in professional soccer players.

Methods: Eight Premier League soccer players performed a unilateral isometric hamstrings test at 90 degrees of knee and hip flexion as part of regular in-season performance screening. Players performed the test by lying in a supine position on a mat with one heel resting on force platform placed on a box. Players were instructed to perform a maximum contraction for 2 seconds by pushing their heel into the platform. Absolute change in asymmetry in peak force (newtons) was evaluated by comparing the two tests performed one week apart. Training data was gathered using a GPS-accelerometry system (Statsports Viper) and match data from Prozone.
Results: Linear regression analysis showed a trend towards an association between change total number of decelerations recorded in match and training and change in asymmetry ($r=0.72$; $P=0.08$). There was no evidence of any association with total distance covered, total high intensity distance or total sprint distance in matches and training and change in asymmetry.

Conclusions: A larger number of decelerations may promote alterations in bilateral hamstring strength balance, and therefore could be considered a factor in hamstring strain injury risk in high intensity intermittent sports.

P05.02
Monitoring sleep, well-being and training load during a season in Norwegian professional football

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A tight match schedule in professional football makes balancing training load (TL) and recovery challenging. Monitoring TL, well-being (WB) and “hours of sleep” (HOS) may help balancing TL and lowering the risk of injuries and underperformance. Our objective was to investigate subjective tools for monitoring during a season in professional Norwegian football. Subjective ratings of TL, WB and HOS were recorded by 54 male players in 4 clubs during 1 season (1130, 1707 and 1707 observations respectively). TL was reported after each training session consisting of “rating of perceived exertion” (RPE) on a 0-10 scale, multiplied by the duration of the session. WB (the sum of fatigue, sleep, soreness, stress and mood ratings, each on a 1-7 Likert scale) and HOS were recorded every morning. Data were pooled and organized by days relative to match day (MD) ranging from MD-3 to MD+3. Only players that played a minimum of 45 minutes were included. Results are presented as means±95% CI. HOS and WB were significantly higher (8.31±0.17 and 22.9±0.7 respectively) on MD and significantly lower (6.24±0.21 and 19.3±0.5) on MD+1 in respect to all other days. TL on MD-1, MD+1 and MD+2 was 65-73% significantly lower than MD (598±45.5) and significantly lower than MD-3, MD-2 and MD+3. These data suggest that professional Norwegian football players have good sleep habits before matches, yet report inadequate sleep after matches. Better WB on MD suggests good periodization, however a decreased WB on MD+1 suggests that WB is sensitive to changes in TL.

P05.03
Capturing player vision: using spatiotemporal analysis to quantify and assess a players passing options

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Data has become an essential element in the assessment of a player’s and teams performance in soccer, however current stats fail to capture the dynamic interactions between players and how this influences the decision making.
This paper proposes a new methodology to capture and assess the decision making of a player based on the configuration of the players on the pitch through the use of Prozone Sports tracking data. By taking into account the spatiotemporal interactions between the ball carrier, defenders and supporting attackers (inter and intra player distance, angle and speed) it is possible to identify passing options available for an individual and how team movement dynamics evolve across a game. By applying a goal expectancy model to each player’s position we can identify the optimal attacking options available and the ability of a player to select this option.

Repeated measure ANOVA reveals significant differences ($p < 0.05$) in the average player availability between positions, the ability of a player to select the most attacking option and the ability of defenders to block high quality passing options. This novel methodology for the first time captures the intelligence of attackers and defenders to create, exploit and block optimal passing options.

It is now possible quantitatively measure the ability of the team in possession to transfer the ball from low to high quality situations and conversely the defending team’s ability to force the ball into low quality situations by reduce passing options or preventing passing options into the key areas.

**P05.04**

Modelling and comparison of acceleration ability of players

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Introduction: It is very meaningful to model acceleration ability of player, for analyzing and comparing the performance of players. We propose a modeling method of acceleration ability of player that reflected their moving velocity, and show the results that applied it to several players in actual games.

Methods: First of all, moving velocity and acceleration vector are calculated at each time from the positional coordinates of the time series, and classified into seven levels according to the strength of moving velocity, for each speed level, the maximal strength of accelerations to each direction is extracted, and finally, the modelled acceleration ability is obtained as a set of approximate circles. After that we compare acceleration ability among players, between 1st half and 2nd half, and in different game situations.

Results: We calculated the acceleration abilities for 6 players from several matches. for example, in a case of Sprinting (moving speed is over 6.11 m/s), the strength of acceleration to the forward direction, that of the backward direction, that of the left side and that of the right side were 1.11, 6.42, 2.56 and 2.79 on the average, respectively. In many players, the acceleration ability to the forward direction of 2nd half became smaller than that of 1st half.

Conclusion: It is possible to measure acceleration ability of player in more detail by using the proposed method. We think that it becomes a useful tool for match analysis.

**P05.05**

Construction of a reliable model for the analysis of soccer as a complex system

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The ecological-dynamics approach to intentional behavior proposes decision-making as a temporally extended process inextricably tied to perception-action. Relevant characteristics of the environment are the opponents’ actions and how these movement dynamics constrain intentional behavior. Investigating player interactions across multiple scales of analysis (e.g., individual behavior-group behaviors) remains an important issue of study in team sports. The aim of this study was to develop an objective model to assess team coordination dynamics throughout a match. This model is based upon three functional zones that were reliably identified by professional and amateur coaches in a recently developed ontological framework (1). Five professional coaches (M=12 years professional experience) were recruited to watch 100 clips of a previously recorded soccer match and identify all players belonging to each of the zones. Inter-rater reliability was high for zone identification (Fleiss's Kappa = 0.72) with agreement amongst raters highest for the intervention (97%) compared to mutual help (91%) and cooperation (93%) zones. These findings suggest that a reliable, objective measure may be derived in order to continuously assess coordination dynamics at these distinct zones where players develop different tactical roles. This model might be used to extend present research related to the coordination dynamics of team synchrony throughout a match, and motivate future research focusing on goal-directed behavior of the player or team in possession of the ball based on opponents’ coordination dynamics.


**P05.06**

**Differences of performances depending on overseas and domestic league players' ratio in 2002, 2006, 2010 soccer World Cups**

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The purpose of this study was to compare and to analyse differences of official states and game results when the ratio of players playing in an overseas football league participated in their respective national soccer team in the 2002, 2006, 2010 World Cups. In this study, the ratio was designed and the quartile deviation was used for the groups (A to D). The results shown as below;

Firstly, there were significant differences (p<.05) in the 10 out of the 23 factors.

Secondly, Group A had a winning percentage of 30.2 %, whereas Group B had 34.0 %, Group C had 37.1 % and Group D had 37.5 %. As a result of analysing the differences for each continent, there were no statistically significant differences as well as the game results.

Thirdly, Group A had the advancement rate of 37.7 %, whereas Group B had 44.2 %, Group C had 55.4 % and Group D had 69.0 %. Thus, this found that there were significant differences (p<.05).

Fourthly, Group A accounted for the largest proportion with 58.1 % in the case of Africa, whereas Group C accounted for the largest proportion with 54.5 % in the case of Asia-Oceania. In the case of Europe, Group D accounted for the largest proportion with 33 % and Group B accounted for the largest proportion in the case of North America. In the case of South America, Group A, B and C accounted for the same proportion with 27 %, respectively.
P05.07
The influence of tackle posture to tackle performance
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Object: In rugby union, a popular contact sport, the tackle is a facet of play and is associated with the largest proportion of serious head and neck injuries. These injuries are directly related to immature tackle technique a) the tackler turns his head away from the ball carrier and does not watch the target b) incorrect tackle body posture prior to contact. Two key factors needed to make an accurate tackle thereby contributing to injury prevention and increasing tackle performance are 1) head up, watching the target 2) turning body square toward ball carrier prior to contact. This study is aimed at showing the importance that these two key factors have in influencing successful tackle performance and preventing injury.

Subjects: The subjects involved were 10 male university rugby players.

Method: We used the tackle machine that can measure tackle impulse force. Comparisons were then made between tackles incorporating the two key factors and with those not incorporating them.

Results: The outcome proved that there was a significant difference in tackle impulse force between tackles made with the incorporation of these two key factors compared to those made without them (p<0.05).

Conclusions: Our findings suggest that a tackle performed with the two key factors may help not only to improve the tackle performance but also to reduce severe tackle injuries in rugby players.

P05.08
Analysis of games missed due to injury in professional soccer: a new potential risk factor
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Introduction: This study analysed the frequency of games missed in through injury in soccer players in the Italian ‘Serie A’ championship across three consecutive seasons (2009/10 to 2011/12) with specific focus on the impact of the player transfer period.
Method: A total of 699 transferred outfield players were considered and split into two groups based on their transfer date: i) NC, players that were transferred by clubs during the off-season period (n=291); ii) NCA, players that were transferred by clubs during pre-season or in-season (n=408). The date of the transfer was obtained from the Italian National League of Professionals Football (Lega Calcio), while player injury status was obtained according to information reports in three major Italian sport newspapers.

Results: A total of 2361 games missed by injury was recorded along the three seasons (2009/10, n = 839; 2010/11, n = 677; 2011/12, n = 845). Chi-square was significant different ($\chi^2 = 23.49; p < 0.05$) between NC (n = 1099) and NCA (n = 1262).

Discussion: Players transferred during pre- and in-season missed more game due to injury. A reasonable explanation could be the exposure to different training methods resulting in an increased risk of injury. Therefore, clubs should give further consideration to adapting training strategies when players are transferred during these periods which might include specific pre-screening and additional monitoring of their workload.

P05.09
Concussion knowledge among Japanese high school rugby teams

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Objectives: Since 2008, the Japan Rugby Football Union has conducted an annual mandatory workshop on safety measures for head coaches of teams nationwide. In 2012 and 2013, this workshop provided lectures on concussions since the rugby players are at risk of suffering a concussion. This study sought to examine whether or not that knowledge was disseminated to high school rugby coaches and players.

Methods: Subjects were 1275 players who played in the 2014 National High School Rugby Tournament. Subjects were asked 11 questions in total. Seven questions concerned knowledge about concussions and 4 questions concerned the action to be taken by coaches to help players return to play following a concussion.

Results: The response rate was 98.4%. The percentage of correct answers to questions about sources of injuries was 40.7%, and the percentage of correct answers to questions about symptoms was 16.4%, so the percentage of correct answers to both types of questions was low. The percentage of correct answers regarding awareness of the risk of concussions for young individuals was 10.3%, and the percentage of correct answers regarding risk awareness was also low. The percentage of correct answers regarding approaches to help a player return to play following a concussion was 33.1%.

Conclusions: This study examined how effectively knowledge about concussions was disseminated to coaches of every team nationwide for a period of over 2 years. Results suggested that knowledge provided in workshop lectures may not be fully disseminated by high school coaches to teams and individual players.
P06 MATCH ANALYSIS - PART I

P06.01
The relationship between physical/technical capacity and tactical prominence in match performance in young soccer players
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The aim of this study was to analyse the association between physical/technical variables and the tactical prominence variables in match. Repeated sprint ability, vertical jump, dribbling and shooting accuracy variables were correlated with three centrality, three prestige and betweenness centrality levels collected from network analysis. An analysis was made to test the variance of physical, technical and tactical levels between tactical positions. 22 amateur soccer players (13.5 ± 0.5 years old, 5.4 ± 0.5 years of practice, 163.3 ± 9.8 cm height, 52.7 ± 10.1 kg weight) from two teams of Portuguese regional league volunteered for the study. It was found a positive and moderate correlation between dribbling test and betweenness centrality (r = 0.324; p-value = 0.142) and negative moderate correlation between %fatigue index and betweenness centrality (r = -0.390; p-value = 0.073). Analysis of variance for physical and technical variables did not found any statistical differences between tactical positions. Nevertheless, when comparing players from tactical positions in the tactical prominence it was found significant differences in three Prestige (F(3,18) = 47.252; p-value = 0.001; η^2 = 0.887) and three Centrality_F3,18 = 7.202; p-value = 0.002; η^2 = 0.546). The results found in this pilot study did not show strong correlations between physical/technical levels and the tactical prominence in match. Further studies must be done to analyse the maturational status and the tactical knowledge and tactical prominence. Moreover, it must be tracked more physical variables and cognitive indicators in order to understand their association with tactical behaviour.

P06.02
High-intensity actions influence shooting success in football
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Football literature often states that high-intensity movements are important to critical match events, however there is no scientific evidence to support this. Using an objective measure of player
movement and video footage we identified if high-intensity movements occurred during critical match events and if they influenced the event outcome. Sixteen Australian state-level youth soccer players (15.6±0.5 yrs) were observed over 17 competitive matches. Player movement data was recorded using 10Hz GPS. Matches were filmed and footage was coded to identify shots at goal and their outcomes (goal or unsuccessful). Movement of the player shooting was analysed from their first movement towards receiving the ball until the ball left their foot. The occurrence of an acceleration or sprint effort was recorded. Odds ratios with confidence intervals were calculated to compare goal success in the presence/absence of accelerations or sprints. There were 255 shots and 55 goals of which 74% and 76% involved either an acceleration effort, a sprint effort or both. Shots that involved a sprint effort had a higher rate of success compared to those that did not (OR=1.96; CI=1.07, 3.59). Shots that involved an acceleration tended to have a higher rate of success than shots that did not (OR=1.24; 0.67, 2.30). High-intensity movements frequently occur during critical match events such as shooting at goal. A sprint by the goal scorer prior to a shot at goal may lead to a higher chance of scoring. Players should practice shooting at goal during, or immediately after performing high-intensity movements.

P06.03
Case study on offensive tactics in top-level women’s football in Japan
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This study aims to identify the characteristics of offensive tactics employed in Japanese women's football by analysing the attacking moves leading up to an attempted goal by using the match performance analysis method. This study uses goals attempted during the Empress’ Cup All-Japan Women's Soccer Championship Tournament as objects of analysis. The analysis was conducted on seven matches from the quarterfinals onwards at the tournament stage of the Empress Cup 2013. Based on the chi-square test, differences with a hazard ratio of 5 per cent or less were considered significant. The analysis showed that, in scenes leading up to an attempted goal or an actual goal, moves consisting of the attacking players dispossessing an opponent of the ball in midfield and attempting a shot after individual dribbling, as well as moves consisting of shooting after one or two passes, were often made. In addition, in assisting situations, the assisting player tended to assist by providing a ground-level pass after one or two touches in midfield. Furthermore, in shooting situations, the shooter often tended to shoot with a one-touch instep kick from the centre of the penalty area or the central area in front of the opponents' goal. The findings have indicated that top-level women's football in Japan is characterized by dribbling attacks utilising individual skills and simple attacks with a reduced number of passes. In addition, shooting situations seem to be characterised by a high success rate of shots attempted from the centre.
P06.04
Assessment of physical performance using GPS during competitive matches in youth elite soccer players

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The aim of this study was to measure physical performance during official soccer competitions using Global Positioning System (GPS) technology. Sixteen youth professional soccer players (age 18±0.2 years, weight 70±7 kg, height 179±6 cm) from an Italian SerieA club were monitored over seven official matches with GPS (SPI-Pro X, GPSports). The high and very-high speed running distances (HSR, 14.4-19.7 and VHSR, >19.8 km/h, respectively) as well as the high metabolic power distance (HPR, >20 W/kg) and the mean metabolic power (Pmet) were considered as indicators of physical performance. No time x position interactions were found (all P>0.05). A significant decrease in HSR, HPR and Pmet occurred through the game (all P<0.001). HSR was 33% lower in the last than in the first 15 min of the game (21.4 vs. 32.2 m/min, P=0.006), whereas HPR and Pmet were lower in the last four compared with the first two 15-min periods (all P<0.05). Full-backs performed significantly higher VHSR (9.4 vs. 5.3 m/min, P=0.03) and Pmet (14.5 vs. 12.1 W/kg, P=0.046) and tended to have higher HPR (29.8 vs 21.1 m/min, P=0.054) compared with central defenders. No significant differences were observed between the other playing positions. This is the first study to assess physical performance during official soccer match-play using GPS technology. The results show that high speed and power distances decreased throughout the game and were higher in full-backs compared with central defenders. Thus, GPS and its-related metabolic power measurements can be used as an additional tool to evaluate match physical performance.

P06.05
Analysis of line movement in elite soccer games

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Introduction: Soccer teams are set up in three lines - defending, midfield and attacking lines - the relations and dependence in and between these lines often affect the games results. Objectives: In the present study, we will investigate the line movement as a whole of the defending, midfield, and attacking line in elite soccer games. Thereby we will analyse, how inter and intra line movement is affected by 1) elapsed time in the match, 2) who is winning, and 3) which overall tactics is used.

Materials & Methods: The ZXY Sports Tracking system is used to analyse at least seven soccer matches in the Danish Superliga, with focus on the three lines: defending, middle and attacking line.

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The system provides 2D-coordinates on all 22 competing players at 40 Hz through the whole match. From these coordinate data each lines mean coordinate - “line COM” - and each lines area - “line coverage” - is calculated at any given time of the match. These two calculated quantities from the matches are statistical compared to
1) elapsed time in the match,
2) winning or losing team and
3) which tactics the teams play by.

Results This study is a work in progress, but pilot studies in women sub-elite games shows that this method can be used.

Discussion & Conclusion It is expected, that the coverage area of the line and the lines COM will correlate with the 3 mentioned markers and that relations can be found and used.

P06.06

Analysis of the impact of team formation on the creation of numerical dominance of F.C.Barcelona during the UEFA Youth League

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Team formation characterizes playing style and determines players’ interactions during matches. When emergent interactions yield in numerical dominance, team formations become of crucial importance to obtain more offensive opportunities (1). The goal of this study was to analyze the impact of the team formation (1-4-3-3) of FC Barcelona on the creation of situations resulting in numerical dominance. We developed an optimal model for playing style, designed to maximize match performance analysis based on team organization, team networking information, and space-time information. Based on our model, researchers empirically tested two key parameters of the model:

(i) the relationship of numerical dominance in space-time and
(ii) players’ interactions (network information) in space-time.

To measure the relationship between numerical dominance and network information, researchers developed a two-dimensional plane with a total of 12 grids to determine x-y positions for each player denoted in zones. Matches (n = 8) were recorded and analyzed with customized software. Based on our assessment of 108 plays, the current study found situations of numerical dominance for each of the zones (M=9, SD=8.034) occurred with a higher frequency (22%) in the areas 4 and 6. Network information analyses reported that the interactions with a higher frequency were 2vs1 situations (48.15%) with the right back being the additional attacker (41.66%). Using the current model allowed researchers to identify formations maximizing the probability of success for a team’s formation and playing style.

P06.07
Analysis of ball circulation of the Brazilian and German National Soccer Teams in the 2014 FIFA® World Cup
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The aim of this study was to examine possible differences in ball circulation between the Brazilian and the German National Soccer Teams in the 2014 FIFA® World Cup. The sample comprised 1267 team possessions performed during the 14 games played by both teams. To analyse ball circulation, the index of Rhythm of Ball Transmission (RBT) was used. This index is calculated from the ratio between the number of balls received (NR) and number of ball contacts (Nct) during the possession (RBT=NR/Nct). Descriptive analysis was performed, as well as the Kolmogorov-Smirnov normality test. Mann-Whitney test was used to compare RBT between the teams. Results displayed significant difference (p<0.001) of RBT between the teams, whereas the German team, who became champions of the tournament, obtained higher RBT values in comparison to Brazil, who were eliminated in the semi-finals. Also, when the teams played each other during the tournament, the team with higher RBT won by a large goals margin (7-1). It is concluded that the team with higher RBT were more successful in the tournament. Therefore, the RBT index might be regarded as a possible predictor of teams' performances during a competition. Keywords: Soccer, Match Analysis, Ball Circulation.

P06.08
Influence of pitch zone in game area dimension in professional Spanish football. Extrapolating from match analysis to tactical training drills
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The pitch zone where game actions are developed has a high influence in player’s tactical behaviours. The different game objectives determine the type of relationship with opponents and team-mates, and player’s positions in the field are influenced by these specific tactical behaviours. The aim of this study was to analyse the influence of the pitch zone in player’s individual playing area, and length and width of the game area that involved the 10 outfield players of each team. A total of 25 matches, 5 per team, of the 1st Spanish Division were analysed. Pitch zone and player’s positions were recorded at intervals of 5 seconds and the pitch was divided into four horizontal zones, according to parallel lines from the touchlines of the pitch. A total data set of 17,546 events were collected. Records where the ball was out of play were removed. The results showed that playing area dimensions are highly influenced by the pitch zone where the ball is located (p<0.001). Player’s positions in relation to the ball were different when game actions were developed in the lateral zones or in the central zones of the pitch. This should be considered to adjust the training drills design depending on the intended tactical aim, directly associated with the zone of the pitch where the training drill is developed. It is also possible to extrapolate the obtained dimension of this full-size game area to include tactical aims in small-sided games.
P06.09
Influence of different systems of artificial turf on the physical performance during a match of male football players

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The aim of this study is to evaluate the influence of different systems of artificial turf on the physical performance in the first 45 minutes of a match. 20 football players (21.65±3.10 years old) were monitored with GPS and heart rate bands on four selected artificial turf systems. The results show less covered distance in high-intensity ranges on the system with higher levels of force reduction and lower rates of rotational traction (p<0.05). Likewise, this system of artificial turf demonstrated a high number of sprints (12.65±5.67), as well as more elevated maximum speed peaks during the last part of the game (28.16±2.90 km/h) in contrast to the systems with better damping capacity (p<0.05). To conclude, the mechanical variability of the artificial turf systems resulted in differences in the activity profiles during the first time of a match.

P07 INJURIES

P07.01
Interest of an injury study for physical preparation coaches

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To plan effective training sessions and prevention programs, it is important to identify the incidence of injuries and when they occur in the competitive season. The aim of this study was to determine the occurrence and type of injuries in a Spanish first-division football team over two seasons of training and competition. A total of 47 injuries were recorded and 34 players were injured. The results showed that the overall injury incidence was 2.52 injuries per 1000h of exposure. Injuries were much more common during competition than during training (16.2 vs. 1.8 injuries per 1000h of exposure). Most of the injuries (87.2%) involved the lower extremities, especially the ankle (23.4%), calf (17%), adductor muscles (14.9%), knee (12.8%), quadriceps (8.5%) and hamstrings (6.8%). Moreover, 63.8% were non-contact injuries and 36.2% were contact, and 42.5% occurred during training and 57.4% during competition. The incidence of injury was highest in October and April, but our results did not reveal a specific location for the injuries in these months. We also noted a progressive rise in the number of injuries over the course of each season, suggesting that accumulated fatigue was the principal cause of injury. for physical preparation coaches, it is important to add a weekly 20-minute session of preventive exercise (ankle proprioception and
strengthening of adductors and triceps-surae) in October and April. In March, we will also add a fourth 20-minute injury-prevention session and reduce training by substituting a weekly recovery session instead of a training session.

**P07.02**

**Very-high chronic workload is not related to injury in elite rugby league players**

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**Objective:** To investigate the relationship between global positioning system (GPS) derived acute and chronic workloads and injury risk in elite rugby league players.

**Methods:** GPS data were collected from 53 elite players over two Australian National Rugby League seasons. Acute (1-week total distance), and chronic (4-week rolling average total distance) workloads were classified as ‘very-low’ through ‘very-high’ based on z-scores. The relative difference between acute and chronic workloads provided a training-stress balance.

**Results:** Very-large effect size (ES) differences (ES = 3.03 ± 0.51 – 6.08 ± 0.40) in total distance were observed between very-high chronic workloads and all other chronic workload categories; yet no significant differences (p = 0.999) in the likelihood of injury were found. There was no difference (p = 0.314) between the proportion of injuries observed at low and high acute workloads. However, when players had a high chronic workload, a very-high training-stress balance increased the risk of injury compared with a moderate training-stress balance (p = 0.038, relative risk = 4.61 ×/÷ 1.8). Furthermore, when players had a moderate training-stress balance, there was no difference (p = 0.140) in injury likelihoods between high and low chronic workloads.

**Conclusion:** Independently, neither ‘high’ acute nor ‘very-high’ chronic workloads influence injury risk in elite rugby league players. However, very-high increases in acute workload, relative to high chronic workload increases injury likelihoods 4-fold. Practitioners should note that high chronic workloads can be achieved without increasing the likelihood of injury, provided that acute workload is systematically increased relative to chronic workload.

**P07.03**

**Mechanism of anterior cruciate ligament injuries in female soccer players**

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Female soccer players have a higher risk of the non-contact anterior cruciate ligament (ACL) injury compared with other athletes. A previous study has reported that the ACL injury often occurs due to contact with a ball and not with other players. However, it has not been clarified which kind of manoeuvre cause the ACL injury. To clarify the above issue, we undertook a questionnaire survey
among female soccer players with ACL injuries to understand the causes for their ACL injuries. We administered the questionnaire to 41 female soccer players with a history of the ACL injury. The players were asked about the circumstances when the injury occurred. The chi-square test was used to analyse the number of injuries. A p-value of <0.05 was considered significant. In 68% of cases, injuries occurred at the time of defence (p < 0.05), with 59% of cases having non-contact injuries (p < 0.05). Among those with non-contact injuries, in 75% of cases, injuries occurred when the players performed the cutting and stopping manoeuvre (p < 0.05); in 59% of cases, injuries occurred at the time of approaching the ball (p < 0.05). Among female football players, non-contact ACL injuries often occurred when they used the cutting and stopping manoeuvre to approach the ball. This maneuver often promoted the stance to behind the centre of gravity, lower knee flexion and increased valgus, leading to an increase in the risk of an ACL injury. This is a specific mechanism of the ACL injury among soccer players.

P07.04
Kinetic characteristics of kicking motion between football players with or without groin pain - from motion analysis of inside kick
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(2) University of Tsukuba, Japan
(3) Tohoku University, Japan

Purpose: The purpose of this study was to reveal the characteristic motion of kicking between football players with or without groin pain.
Methods: Three-dimensional motion analysis was performed for male university football players. Inside kicking motion of eight players with the groin pain (GP) and nine players without the pain (NP) were analyzed thrice. Analyzing interval was from the maximum hip extension of the kicking leg (MHE) to the foot contact of the pivot leg (FC) and to the ball impact (BI).
Results: Maximum torque from MHE to BI of the kicking leg in the GP group (flexion 77.40±31.17 N/kg, adduction 39.22±9.98 N/kg) was significantly higher than that of the NP group (flexion 62.61±14.03 N/kg, adduction 32.15±9.91 N/kg). Relative rotation angle of the upper and lower trunk in the GP group (11.13±6.45°) was significantly smaller than that of the NP group (17.73±8.49°). Ankle dorsiflexion angle of the pivot leg was significantly smaller in the GP group (FC 15.0±5.1° and BI 12.2±7.3°) than that of the NP group (FC 20.6±4.9° and 18.3±7.6°).
Discussion: From these results, inside kick of the players with groin pain can be speculated that the gravity center being backward against the pivot leg and that it depends on the hip torque caused by the deteriorated trunk rotation leading to inefficient kicking leg movement. This may have a relationship with the occurrence of the groin pain.

P07.05
The effect of mobilising the L4 and L5 zygapophyseal joints on hamstring extensibility in elite footballers
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Objectives: Extensive research has been conducted on hamstring injury prevention. The role of the lumbar spine in hamstring pathology prevention is a key area of this research. Therefore, this study aimed to compare the immediate effects of L4/5 mobilisations on measures of neurogenic and myogenic hamstring extensibility of the hamstrings in asymptomatic elite male soccer players.

Subjects: Twenty-five male soccer players from an English Premier League team with no current injury history were recruited.

Methods: Players were randomly assigned to one of two groups, intervention or control. Neurogenic hamstring extensibility was measured pre- and post-mobilisations by the straight leg raise test. The myogenic hamstring complex was measured by the passive knee extension test. Following pre-test assessment, subjects in the intervention group received specific lumbar mobilisations to the unilateral L4/5 zygapophyseal joint, 3 times for 1 min, with each mobilisation separated 1-min recovery, nominated by dominant kicking foot. The control group received no mobilisations between pre- and post-measures. Data were analysed using magnitude-based inferences.

Results: Lumbar mobilisations had a very likely small beneficial effect on the straight leg raise test (6.3%; 90% confidence limits ±2.7%) and a likely small beneficial effect on the passive knee extension test (-23%; ±14%).

Conclusion: Specific lumbar mobilisations have the ability to increase the neurogenic and myogenic extensibility of the hamstring muscle group in elite male soccer players in the immediate term. Further research is required to assess the ability of lumbar mobilisations to influence hamstring extensibility in the longer term.

P07.06
Influence of subjective ankle instability on performances in female collegiate soccer players
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Objective: The objective of this study was to reveal the relationship between subjective ankle instability (SAI) and female collegiate football players’ performances.

Methods: 16 female collegiate football players (mean age = 19.7 ± 1.4 years, mean height = 159.8 ± 7.6 cm, mean weight = 56.7 ± 6.1 kg) participated in the study. The players were classified into either the SAI group (5 players) or the control group (11 players) based on the Karlsson score. All players underwent five performance tests: Yo-Yo Intermittent Recovery test, 10 m × 5 Shuttle run, Arrowhead Agility test, Figure 8 hop test and Side hopping test. Results of the tests were compared between the two groups.

Results: Significant differences were found in the Figure 8 hop test (P ≤ 0.05) and the Side hopping test (P ≤ 0.02). The SAI group was significantly slower in the Figure 8 hop test (9.9 ± 0.9 seconds) but faster in the Side hopping test (6.9 ± 0.5 seconds) than the control group (9.2 ± 0.6 and 7.6 ± 0.8 seconds, respectively). No significant differences were found in the other performance tests.
Conclusion: The results suggest that the anterior direction motion is more likely to be influenced by the functional ankle instability than the lateral direction motion. Therefore, regain of normal anterior direction motion is considered to be one of the criteria of recovery process in female soccer players with functional ankle instability.

P07.07
Effect of self-reported concussion history on dynamic cerebral blood flow regulation in rugby football players
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It has been reported that cognitive function was impaired in collision sports athletes with a concussion history. However, the mechanism of this cognitive impairment remains unclear. We hypothesized that this cognitive impairment was associated with attenuated cerebral circulatory function. In the present study, to test this hypothesis, we measured dynamic cerebral autoregulation in collegiate rugby football players with a concussion history. Eighteen male players participated in this study. After a questionnaire survey, They were classified into two groups; players with never or one time concussion history group (9 players, 20±1 yrs, 175±5 cm, 85±8 kg) or repeated concussion history group (9 players, 20±1 yrs, 173±2 cm, 80±4 kg). The cognitive function was assessed using a test battery of the sports-related concussion (CogSport: CogState Ltd, Australia). In addition, dynamic cerebral autoregulation was identified by the bilateral thigh-cuff release technique. The rate of regulation (RoR) as an index of dynamic cerebral autoregulation was calculated from changes in the middle cerebral artery mean blood velocity during an acute hypotension. As expected, cognitive function in repeated concussion players were significantly lower than those in never or one time players (p < 0.05). In contrast, there was no difference in the RoR between groups (0.252±0.10 vs 0.259±0.12/s, P=##). These findings suggested that the cognitive impairment in collegiate rugby football players with a concussion history was not related to a characteristic of dynamic cerebral blood flow regulation.

P07.08
Player load monitoring in football: Does body-worn accelerometry predict centre of mass acceleration in football-related movements?
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Whole-body centre of mass (CoM) acceleration is directly related to the external loads acting on a player’s body (F = m × a), which may cause injuries. The objective of this study was to determine the linear relationships between unprocessed data from body-worn accelerometry and CoM acceleration during common football-related movements. Fourteen team sports athletes (age: 23 ± 3 years, mass: 73 ± 10 kg, height: 1.78 ± 0.7 m) were asked to complete three tasks; straight line
running, 45-°ree side-cutting and 90-°ree side-cutting at four different approach speeds 2, 3, 4 and 5 m/s (± 5%). Accelerometry data were collected from a Catapult unit (MinimaxX S4) located on the upper trunk and from three accelerometers (518 DTS Noraxon accelerometers) located on the upper trunk, sacrum and tibia. CoM accelerations were determined from 3D kinematics. PlayerLoadTM data were determined from one foot-ground-contact (pivot contact for the cuttings tasks) and the coefficient of determination (R2) was calculated to determine the relationship between PlayerLoadTM calculated from centre of mass (CoM) and accelerometry data. Poor to moderate R2 values (Table 1) were observed between PlayerLoadTM calculated from CoM acceleration and trunk accelerations. The relationship was influenced by task as stronger relationships were observed for cutting compared to running. Accelerometer location had little effect on the relationship. Unprocessed body-worn accelerometry data does not appear suitable for directly estimating the external loads acting on a players’ body. More comprehensive data processing techniques are needed to increase our chances to reveal valuable information relating to injuries.

<table>
<thead>
<tr>
<th>Task</th>
<th>Catapult (Trunk)</th>
<th>Trunk</th>
<th>Sacrum</th>
<th>Tibia</th>
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P07.09

FMS in sub-elite soccer players: screening and corrective intervention
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The Functional Movement Screen (FMS™) is an injury-screening tool developed to identify an athlete’s dysfunctional movement patterns. FMS comprises a series of seven fundamental movement tests. The purpose of this study was to examine fundamental movement patterns differences among sub-elite soccer players and to evaluate the effect of a training intervention on FMS score. 91 soccer players were recruited from the first team (FT), Under 19 (U19), Under 17 (U17) and Under 16 (U16) of a sub-elite club. FMS assessment was led by the same expert rater. The sum of High Movement Level Pattern (HLP), Transitional Movement (TM) and Fondamentaly Mobility (FM) scores were also calculated. Moreover, a training intervention was prescribed for 15 FT players, twice a week for 12 weeks. Pre- and post- training intervention FMS overall test scores were compared. FMS and HLP scores were 13.91±1.89 and 5.57±1.17 respectively with significant differences between teams (U19=U17>FT=U16, p<0.05). FM was 4.90±0.83 (U19>U17=U16, p<0.05). No TM differences were detected (TM=3.44±0.67). The first team’s FMS score significantly increased after the training period (13.27vs15.87, F=13.06, p=0.001). Fourteen players
displayed an FMS score above the injury threshold (FMS score<14) at the end of the intervention, compared with the seven players prior training ($\chi^2=7.78$, p<0.01). Between-teams movement patterns differences were significantly detected, in spite of common weaknesses concerning deep squat and rotatory stability. Furthermore, the introduction of a corrective exercise program could result in being effective to enhance a player movement pattern and overcome the cut-off point for injury risk.

**P07.10**

**Injury risk after returning from concussion in elite rugby players**

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Background: Evidence from soccer suggests an increased risk of injury following return to play after concussion, but this has not been investigated in Rugby Union.

Aim: To determine whether concussion is associated with increased risk of subsequent time-loss injury in professional Rugby Union.

Methods: This was a prospective cohort study of 810 professional Rugby Union players over two seasons (1176 player seasons overall). All time-loss injuries including concussion were collected by team medical staff. Incidence rate ratios (IRR) were calculated for injury incidence in players who had been diagnosed with concussion compared to those who were not. Survival time to subsequent injury was calculated following 135 concussions and a random sample of 135 other injuries. Subsequent injuries were included if they occurred in the same season as the original injury.

Results: Subsequent match injury incidence for all time-loss injuries in players (n=135) who had been diagnosed with concussion (122/1000 hours, 95% CI; 106-141) was significantly higher (IRR 1.6; 1.4-1.8) than those that had not (76/1000 hours; 72-80), but injury type was not different. Median survival time following return to play was significantly shorter following concussion (53 days; 41-64) than non-concussive injuries (114 days; 85-143). 13 players sustained a concussion as their first injury after returning to play following concussion.

Conclusions: Subsequent injury risk was significantly greater in players returning to play following concussion. The reason for this increased risk is unclear, but the effect of a more conservative return to play following concussion on subsequent injury risk should be investigated.
P08 TESTING - PART I

P08.01 Relationships between isokinetic knee strength and jump performance in amateur soccer players
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It is thought that jump performance and isokinetic knee strength parameters are related. The purpose of this study was to investigate the relationship between isokinetic strength of knee and vertical jump. Twenty-one healthy young male soccer players (Age: 22.55±2.7 years, height: 175.0±3 cm, body weight: 72.69±6.7 kg,) voluntarily participated in this study. Squat Jump (SJ), and Counter Movement Jump (CMJ) test were performed. Bilateral concentric isokinetic strength of the knee extensors/flexors was evaluated at 60◦/s. Relationships between isokinetic knee strength and jump performance parameters were analyzed with Pearson Correlation Coefficient. Probability level was >0.05. The results of this study showed that CMJ height had a significant and moderate relationship with the isokinetic knee strength of extension measured at only right knee 60◦/s (r=0.439*, p<0.05), whereas SJ height was not correlated with any of the isokinetic strength parameters. In conclusion as a result the only significant correlation between CMJ jump and isokinetic right knee 60◦/s, may be due to the right of footballers dominant leg. There are much more correlation studies are necessary with different angular velocities of knee isokinetic parameters, and jump parameters.

Keywords: Isokinetic strength, knee, squat jump, counter movement jump

P08.02 The role of hormonal, physical and anthropometric measures in predicting small-sided-games performance in young elite soccer players
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This study aimed to investigate the association of Small-Sided-Games (SSG) skill-related performance (SRP) with testosterone, body mass, stature, and physical performance (CMJ, Squat jump, YoYo Recovery test, 10-m and 30-m sprint running, and repeated sprint ability). Forty-five young soccer players (14.3 ± 0.2 yrs, 170 ± 6 cm, and 59.5 ± 6.1 kg), belonging to one of the major professional soccer clubs in Brazil were assessed in 2 occasions (T1 and T2; separated by 4 months) during the competitive season. SRP was assessed by means of the frequency of shooting, complete and incomplete tackles, complete and incomplete interceptions, successful and unsuccessful passes, successful and unsuccessful headers, and total involvement. To identify the structure of relationships between the SRP parameters, the Principal Components analysis (PCA) was adopted for T1 and T2, separately. PCA revealed 5 factors for each time-point. To verify the prediction of multiple dependent variables (SRP) from multiple independent variables, the most representative
variable extracted from the PCA, for each component, was used, and a multivariate canonical correlation analysis was employed. The canonical R was 0.63 ($\chi^2 = 72.08$, $p = 0.006$; total redundancy given the other set = 15%) for T1, and 0.70 ($\chi^2 = 84.36$, $p < 0.000$; total redundancy given the other set = 18%) for T2. In summary, the current findings suggest that this set of independent variables is not sufficiently powerful to predict SSG performance, but might influence it, and that the relationships appear to be highly stable over a 4 month-time period.

P08.03
Physical characteristics of Japanese professional soccer players in their senior year: a case control study
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Physical characteristics are very useful indicators for spotting talent. Some collegiate soccer players advance to play in the J League—Japan professional football league. However, anthropometric and fitness characteristics remain unknown during their college days. This study aims to compare the senior year profiles of the players who later became professional players with those who did not. The study also investigated the relationship between their professional status and physical profile. A total of 98 Japanese collegiate soccer players were analyzed. From 2005 to 2014, eighteen out of the 98 players advanced to play in the professional level (J League) after graduation, whereas the rest did not. Body composition of all the players in their senior year were measured using bioelectrical impedance analyzer. They also undertook sprint and vertical jump tests in their senior year. The lean body mass (LBM) score, expressed as the ratio of LBM to height, and the vertical jump height for professional players was higher [35.6 ± 2.0 kg/m, 63.5 ± 5.0 cm] than non-professional players [33.8 ± 2.3 kg/m, 58.9 ± 5.2 cm] (p<0.01). By using logistic regression analysis, a significant association of professional status with LBM score [adjusted odds ratio (OR) = 1.480; 95% confidence interval (CI) 1.118–1.960] (p<0.01) and with vertical jump height [adjusted OR = 1.147; 95% CI 1.029–1.277] (p<0.05) was observed. LBM and vertical jump height scores during the senior year can be used as indicators for determining whether collegiate players can progress to play professional level football in Japan.

P08.04
Diagnostics, level and differences in fitness performance of players from U15 to U21 category
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The aim of the study was to find out differences in fitness performance of youth elite soccer players from the perspective of their age. Elite players (n=162) of 5 age categories (U15=15, U16=37, U17=33, U19=38 and U21=39) were assessed using the following tests: a) linear speed: sprint 5 m (S5), 10 m (S10) and flying 20 m (FL20); b) change of direction speed (CODS): test 505 with turning
on the dominant (505D), non-dominant leg (505N), K-test; c) repeat CODS (RCODS); d) endurance: Yo-Yo IRT1 (Yo-Yo) and e) speed of the kick for dominant (SKD), non-dominant (SKN) leg. Age had a significant effect on performance in all monitored parameters: $S_5$ ($F_{4,157}=15.33$, $p<.01$, $\eta^2=.28$), $S_{10}$ ($F_{4,157}=19.87$, $p<.01$, $\eta^2=.34$), $FL_{20}$ ($F_{4,157}=35.58$, $p<.01$, $\eta^2=.48$), 505D ($F_{4,157}=14.30$, $p<.01$, $\eta^2=.27$), 505N ($F_{4,157}=11.18$, $p<.01$, $\eta^2=.22$), K-test ($F_{4,157}=26.91$, $p<.01$, $\eta^2=.41$), RCODS ($F_{4,157}=9.96$, $p<.01$, $\eta^2=.20$), Yo-Yo ($F_{4,157}=11.15$, $p<.01$, $\eta^2=.22$), SKD ($F_{4,157}=104.82$, $p<.01$, $\eta^2=.73$) and SKN ($F_{4,157}=88.84$, $p<.01$, $\eta^2=.69$). The comparison of performance in U21 vs. U19 revealed a significant difference only in $S_5$ performance ($p<.05$). The players of U19 achieved better performance in comparison to U17 in the following tests: $FL_{20}$, K-test, SKD, SKN and Yo-Yo ($p<.05$). The players of U17 were significantly better in comparison to U16 only in SKD and SKN performance ($p<.01$). The players of U16 were better in comparison to U15 players in all tests except Yo-Yo and RCODS. Uniform conception of testing in a professional club enables us to develop fitness performance while maturing and to stimulate the player’s weaknesses using specific individual training.

P08.05

Investigating the use of a Point of Care salivary amylase test in the English Premier League soccer environment

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Introduction: A Point of Care (POC) test for measurement of antibody or cortisol concentrations has given rapid feedback to coaches and support staff in Premier League soccer clubs within a matter of minutes from sample collection. This has been useful in assessing fatigue levels, immune status and readiness to train / compete and offers a considerable time advantage over standard laboratory methods. This current paper assesses a new antimicrobial protein test on the same POC platform, namely salivary alpha-amylase (sAA), which has potential for assessing both acute and chronic responses to training and competition. This method is compared with standard laboratory ELISA determination, which takes much longer to perform and requires full laboratory equipment.

Methods: A total of 25 saliva samples were taken from a cohort of English Premier League soccer players (23.5 ±6.4 yrs) using Ipro OFC kits. The samples were taken before training during routine monitoring. The samples were immediately analysed on POC Lateral Flow Device to determine sAA concentrations and then taken to a laboratory for subsequent analysis via ELISA.

Results: The sAA concentrations measured via ELISA ranged from 210-3295 μg/ml and with the POC 64-3679 μg/ml with the POC giving lower values in most cases. The relationship between sAA values on both tests was represented by the formula: $y = 0.866x + 495.8$, with $R^2$ 0.8637.

Conclusion: The POC test showed good agreement with ELISA, so given the speed of data turnaround and cost efficiency, represents a suitable alternative for sports teams.
P08.06

**Prediction of mature stature in adolescent soccer players aged 11-16 y**


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This study aimed to examine the agreement between invasive (TW2 and TW3 skeletal age) and non-invasive (estimated maturity offset) protocols to estimate mature stature, and the interrelationship among maturity groups derived from concurrent protocols in a mixed-sample of 160 Belgian and Brazilian elite youth soccer players, aged 10 to 16 years. The results showed that the correlations between the invasive and non-invasive protocols to predict mature stature were very large to nearly perfect (ranged 0.70 to 0.95). The bias (mean difference between measurements) was +3.98 cm (±4.17 cm) for the non-invasive method against the TW2 equation. Correspondent values were +2.98 cm (±4.63 cm) against TW3 equation. for the total sample, percentages of agreement between maturity categories derived from the protocol that estimates ‘age at peak height velocity’ and based on the difference between skeletal and chronological age ranged between 45.9% and 56.1%, for TW2 and TW3, respectively. Corresponding values for the method estimating mature stature were 64.4% and 78.9%, for TW2 and TW3, respectively. In conclusion, caution is needed in the transformation of non-invasive protocols into somatic maturity categories. The current results confirmed that this approach tend to over-estimate the percentage of players who are on time, although the literature consistently suggest adolescent soccer players as more likely to be advanced according to the discrepancy between skeletal age and chronological age.

P08.07

**Holistic patterns as an instrument to predict performance of promising young football players**

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Multidimensional talent models represent the current state of the art. However, it remains unclear how these different dimensions interact. Based on current theories of human development, person-oriented approaches seem to be particularly appropriate for talent research. The present study adopts this approach by looking at how a holistic system consisting of the dimensions motivation, motor behaviour and the stage of development goes along with athletic performance. for this purpose, it has to be examined which patterns were formed by the constructs net hope, motor abilities, technical skills and the so far achieved percentage of the predicted adult height and how these patterns are related to subsequent sporting success. 119 young elite football players were questioned and tested three times at intervals of one year, beginning at the age of 12. At the age of 15, the performance level the players had reached was examined. At all three measuring points, four patterns were identified which displayed partial structural and high individual stability. As
expected, the players showing values above average in all factors were significantly more likely to advance to the highest performance level. Physically strong, precocious developed players though having some technical weaknesses, have good chances to reach the middle performance level. The results point to the importance of holistic approaches for the prediction of performance among promising football talents in the medium-term and thus provide valuable clues for their selection and promotion.

P08.08
Longitudinal performance development in national youth soccer players
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The aim of this study was to show developments in physical parameters from the age of 15 to 19 years in male soccer players. Thirty-nine national youth soccer players were tested four times over four years (U16, U17, U18, U19). Beside anthropometric measurements, the test battery consisted of a 40m sprint with 10m split time (t40m, t10m), countermovement jump (CMJ), core muscle strength (ventral, lateral and dorsal) and the Yo-Yo test. One-way repeated measures ANOVA revealed significant improvements and high Cohen’s Effect Sizes (ES) over four years in t40m (-1.1), t10m (-0.8), CMJ (1.3), Yo-Yo test (1.1) and ventral core strength (0.6). There were no significant changes in lateral (0.4) or dorsal core strength (-0.1). Bonferroni post-hoc tests show significant improvements and moderate ES (>0.5) from U16 to U17 in t40m, t10m, CMJ and in the Yo-Yo test. Only trivial to small ES from U17 to U18 and from U18 to U19 were found in t10m (-0.3 / -0.1), t40m (-0.4 / -0.1), CMJ (0.3 / 0.4) and the Yo-Yo test (0.2 / 0.2). Nevertheless, 17 players had worthwhile enhancements from U17 to U19 in both t40m and Yo-Yo test. Six players had worthwhile enhancement in t40m only and nine players in the Yo-Yo test only. In general, physical test performances improve mostly from U16 to U17 and level off at the age of 17. However, nearly half of all players have worthwhile enhancements in both speed and endurance after age 17.

P08.09
Relationships between lower body dynamic strength, jump and knee isokinetic parameters of soccer players
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The purpose of this study was to investigate the relationship between lower body dynamic strength parameters, jump and knee isokinetic parameters. Fourteen healthy young male soccer players (Age: 22.55±2.7 years, height: 177.0±6.1 cm, body weight: 70.53±3.4 kg) voluntarily participated in this study. Squat Jump (SJ), and Counter Movement Jump (CMJ) test were performed. One repetition maximal test for half squats was used as lower body dynamic strength parameters. Knee isokinetic parameters at 60 and 180°/sec-1. Relationships of squat jump, and counter movement jump with lower body dynamic strength parameters and knee isokinetic parameters were analyzed.
with Pearson correlation coefficient probability level was ≤0.05. There was a statistically negative relationship between dynamic strength and left knee extension/flexion torque rate at 180°sec-1 (r=-0.110, p<0.05). There was a statistically negative relationship between; SJ and CMJ right knee flex at 60°sec-1 (r=-0.043, r=-0.173, p<0.05). SJ and CMJ and right knee ext/flex at 60°sec-1 (r=-0.340, r=-0.344 p<0.05). SJ and CMJ and left knee ext/flex at 60°sec-1 (r=-0.101, r=-0.069 p<0.05). SJ and left knee ext at 180°sec-1 (r=-0.176, p<0.05). CMJ and left knee flex at 180°sec-1 (r=-0.243, p<0.05). SJ and left knee ext/flex at 180°sec-1 (r=-0.006, p<0.05). The results of this study showed that there were no statistically relationship between the jump, knee isokinetic parameters and the lower body dynamic strength parameters. In conclusion, much more correlation studies are necessary with different angular velocities of knee isokinetic parameters, and also different lower body dynamic strength parameters.

Keywords: Isokinetic Strength, Knee, Squat Jump, Counter Movement Jump, Half Squat

P08.10

Two seasonal variation in power performance and bilateral force differences in soccer players

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The purpose of study was to find differences in power performance and bilateral force differences during the takeoff phase in elite soccer players over the 24 months. Seventeen Czech professional soccer players (age =26±4.6 years, height =183±5.7 cm, weight =78±6.1 kg) were examined using two force platforms in three types of the vertical jump: countermovement jump free arms (CMJ-FA), countermovement jump (CMJ) and squat jump (SJ). The following parameters were assessed: height of jump (HJ), total force production during the take-off phase (Fmax), separately for the right (FR) and left (FL) leg, bilateral force (BFD) and “impulse” (BID) differences. Repeated measurement ANOVA and Bonferonni’s post-hoc tests were used for statistical analysis. The results showed a significant effect of time on HJ in CMJ-FA (F3,48=4.50, p<.01, η²=.22) and CMJ (F3,48=6.25, p<.01, η²=.28). In all jump tests, we found a significant effect of time on FR (CMJ-FA: F3,48=2.91, p<.05, η²=.04; CMJ: F3,48=3.90, p<.05, η²=.20; SJ: F3,48=5.37, p<.01, η²=.25), however FLmax and FL was not significant in any test (p>.05). The effect of time on BFD was significant only in CMJ (F3,48=3.40, p<.05, η²=.18) and in case of BID, there were significant changes in SJ (F3,48=3.73, p<.05, η²=.19). Bonferonni’s post-hoc tests showed better values at the beginning of the summer training period in comparison to the winter one which is caused by a shorter pause between the competitive and preparatory period. Longitudinal monitoring of parameters of explosive abilities can help the coaches to compare performance as well as health preventive procedures.
P08.11
Talent development in football and socio-spatial factors as possible key constraints. Towards an ideal training model

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Most studies related to the talent development in football have been one-dimensional. Although there are multi-dimensional analyzes under the dynamical ecology perspective, few studies have explored the influential socio-spatial factors on the development of talent. The purpose of this study was to analyze the differences in the international representation of clubs (n = 821) and national teams (n = 59) regarding the development of the players who participated in the FIFA World Cup 2014. Clubs and national teams were classified into ranking and divided into quartiles by the number of players trained from 15 to 23 years (clubs and national teams that had trained those players for at least three years between these ages), and the number of U-23 matches played by those players. Significant differences were observed between the clubs in the number of players that they trained (p < .05) and the number of U-23 matches that the players played (p < .05). It was also observed between the national teams (p < .05). Some clubs like Feyenoord Rotterdam and Barcelona formed up to nine players. At national level France topped the table with England and Germany. The findings indicate the need to analyze what kind of practices are the top players doing within the period between 15 and 23 years. There is the possibility that these factors were socio-spatial constraints potential keys for talent development in football.

Keywords: socio-spatial factors, talent development, football, constraints.

P09 TRAINING - PART I

P09.01
Soccer match play and training: a comparison of external training load responses

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Objectives: The current study was designed to investigate the patterns of PlayerLoadTM and the locomotor activities during actual match play and different training typologies.

Methods: Individual match (n=208) and drill cases (n=11967) from 22 professional soccer players were monitored during the 2012/2013 and 2013/2014 English Championship season using MEMS devices containing 100Hz tri-axial accelerometers and 10Hz GPS chip (S4, MinimaxX, Catapult Sports, Melbourne, Australia). The vector magnitude derived from the accelerometer (PlayerLoadTM; PLVM) and Total distance covered (TDC) was recorded and made relative to the duration of the drill and to one another (PL: TDC). Training drills were grouped into 9 categories. These were Conditioning Drills (CON), Competitive Games (CG), Position Specific Coaching
Drills (PS), Possession (POS), Small Sided Games (SSG), Tactical Drills (TAC), Technical Drills (TEC), Testing sessions (TEST) and Warm-ups (WUP).

Results: POS drills elicited a significantly increased PL: TDC in comparison to all other drills (P>0.01). Furthermore, both TAC and TEC showed increased significant values compared to SSG's and CG (P>0.01). CON had the highest metres per min and TEST had the highest PLVM per min.

Conclusions: Practitioners should be aware that non-conditioning or non-SSG drills can elicit higher relative PLVM and PL: TDC and incorporate these as part of their planning.

P09.02
Changes in the 30-15 Intermittent Fitness Test after two weeks of high intensity pre-season training in elite rugby league players

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The aim of the present study was to examine the sensitivity of change in the 30-15 Intermittent Fitness Test (30-15IFT) after two weeks of high intensity preseason training. Nineteen professional rugby league players performed the 30-15IFT before and after a two-week training intervention, which included thirteen sessions/week: four resistance training sessions (60 min), three technical and tactical skill training sessions (25 – 40 min), two speed and agility sessions (30 min), two high-intensity interval running training sessions (14 – 24 min of generic running at 90 – 100% of 30-15IFT maximum velocity (VIFT)), one small sided game session (40 min) and one wrestling session (50 min). Using the session-RPE method, participants completed 2801 AU and 3238 AU of training during the first and second week of training respectively. The high-intensity interval running training and small sided games sessions combined represented 22% and 26% of the total training volume in week one and two respectively. The within-test % change suggested a small sensitivity to training for the 30-15IFT (+3.28%, p = 0.02) and this change was rated as moderate, i.e., standardized difference, ES = +0.7 90%CL. When using the 30-15IFT to determine training velocities and ensure the accuracy of individualized interval training in professional rugby league players it is important to conduct regular testing. A short intensive training block in the early pre-season phase of rugby league training will cause a change in the mean 30-15IFT score and should be monitored regularly.

P09.03
The effects of the Dynamic Game Rule in SSGs for soccer

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The purpose of this study was to observe the effects of the dynamic game rule (DGR) during SSGs. 10 young male soccer players (age 19.2 ±0.5 years, height 188.3 ±4.6cm, weight 75.9 ±8.5kg) voluntarily participated in this study (5vs5 SSG design, excluding goalkeepers). Each SSG game was performed 3 times for 8min with 5min passive rest periods between bouts. In order to understand the effects of this DGR only large playing area was used. The SSGs were played two
ways on the large playing area. One of them is free play, the other is rule applied. Regardless of the type of playing area used, SSG applied DGR was performance on a pre-determined active playing area of 600m2 on the large playing area. During these two different conditions, time-motion characteristics (maximum speed, total distance (TD) and distance covered at various speed categories), heart rate (HR), blood lactate concentration (BLC) and rating of perceived exertion (RPE) values were collected for future analysis. Shapiro-Wilk test was used to verify normal distribution and Levene’s test was applied to assess the homogeneity of variance. The paired-samples t-tests were used to test for significant differences in each of the dependent variables. This study demonstrated that, increasing playing area and especially when the SSG was conducted in a dynamic nature, significantly increased HR, BLC, RPE, TD and total distance travelled at different speeds. Therefore, to increase work intensity, coaches can use this dynamic approach in future SSG designs.
P09.04
Heart rate responses and distance coverage during 1vs.1 duel in soccer: effects of neutral player and different task conditions
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The aim of this study was to determine the effects of using neutral players and different task conditions in 1 vs.1 small-sided games (SSG) on amateur soccer players’ heart rate responses and distance coverage. Ten amateurs’ soccer players (26.4 ±5.3 years old, 8.0 ± 3.2 years of practice, 45.8 ± 2.6 ml.kg–1.min–1 VO2max) from a Portuguese regional league participated in this within-subject repeated measures study. Each player played in the same 1 vs. 1 format with (1vs1N) and without (1vs1) neutral player, and three task conditions (T1 – no goal, T2 – no goal but endline, T3 – goal). Order of the task conditions was randomized within one session. Each SSG lasted for 3 minutes, with 3 minutes of passive recovery between SSG. The heart rate responses, distance coverage, speed and acceleration were recorded throughout all SSG. Two-way MANOVA results revealed that neutral players (F = 43.6; p = 0.001; Power = 1.00; small effect size) and task conditions (F = 84.7; p = 0.001; Power = 1.00; small effect size) had significant main effects and small practical effects sizes on heart rate responses and distance coverage. It was concluded that, in very small-sided game, the use of neutral players increased the heart rate responses and distance coverage. Moreover, games with T2 setting had the highest heart rate responses and distance coverage. This study provided empirical evidence for coaches during very small-sided game in regard of the usage of neutral player and different task conditions.

P09.05
Is the 2-a-side soccer game for anaerobic training?
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Objective: Smaller game formats such as 1vs1 or 2vs2 (2-SG) eliciting higher blood lactate concentration ([La]) compared to larger game formats such as 6vs6 or 8vs8 are commonly used by soccer coaches to develop the anaerobic energy system. The aim of this study is to investigate the energetic profile of 2-SG.
Methods: 11 professional U-17 soccer players (16.2±1.2 yrs, 1.80±0.10 m, 68.5±7.7 kg) performed the 2-SG with one bout of 2 min duration. The aerobic (W_AER), anaerobic alactic (W_PCr) and
anaerobic lactic share (W\textsubscript{BLC}) was calculated based on several previous studies (1, 2) using portable spirometry and lactate determination.

Results: The absolute energetic cost of W\textsubscript{BLC}, W\textsubscript{PCR}, and W\textsubscript{AER} are 14.3±8.1 kJ, 35.4±11.6 kJ and 105.7±16.6 kJ, respectively. The relative energetic fractions of W\textsubscript{BLC}%, W\textsubscript{PCR}%, and W\textsubscript{AER}% are 8.8±4.3 %, 22.6±4.6 % and 68.6±6.0 % of total energy demand, respectively.

Conclusion: This study demonstrates that the anaerobic energy supply covered approximately 30 %, the share of the anaerobic lactic influence was about 9 % only. Actually, the aerobic energy supply with approximately 70 % of the total energy demand plays a key role for 2-SG.

References:

P09.06
Concordance analysis between four commonly used lactate threshold measurements method in professional soccer players
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Lactate threshold (LT) is a commonly used measurement in physiological control of soccer performance. Currently, diverse methods for measuring LT had been used to determinate LT, but the concordance between different methodologies in professional soccer players is poorly understood. Therefore, the aim of this study was determine the concordance between four methods commonly used LT determination. Professional soccer players (n=20) were recruited (age 24.7 ± 3.7 years, body mass 70.1 ± 5.3 kg, height 172.8 ± 7.3 cm) for this study. An incremental test was performed to determine heart rate (bpm) at LT (LTHR) and speed (km-h\textsuperscript{-1}) at LT (LTS). During the 1-min interval between speeds, capillary blood was collected for blood lactate analysis. Lactate concentrations (mM) were analysed with the visual inspection [LTL]; maximum distance [Dmax]; modified [DmaxM]; logarithmic method [Log-log] methods. In LTS was observed that LTL, DmaxM and Dmax were different vs. Log-log method and LTL and Dmax were different vs. Dmax. In LTHR was observed that LTL, DmaxM and Dmax were statistically different vs. Log-log method and DmaxM was different vs. Dmax. The Bland-Almant analysis shows better concordance in LTL vs. DmaxM compared to other methods in LTHR and LTS. These results suggest that LT is
method-dependant and it is necessary to choose adequate method to assess professional soccer players.

Key words: Threshold, lactate, training, soccer.

P09.07
Difference of time-motion characteristics and heart rate response for 4vs1 small-square possession training between defensive player and possession player in soccer
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Introduction: The 4vs1 small-square possession training (SSP) has been considered to be a popular means of the beginning part of the training session in Japan. It is hypothesized that intensity of the SSP is different for the possession players (PP) and defensive players (DP). Therefore, this study was intended to elucidate the intensity of the 4vs1 SSP to optimize the exercise in soccer training.

Methods: Ten collegiate soccer players participated in this study. One minute 4vs1 SSP was performed at 5m~5m pitch size without interruptions due to out of the ball from the pitch. Four PP were allowed to touch the ball one time per play, and one DP continued to try to take the ball away from PP throughout the one-minute set. Players performed rotationally with one-minute recovery. The time-motion characteristics were measured using a GPS. HR was recorded using standard chest strap. A t-test was used to examine differences in performance.

Results: Total distance covered, peak and average running speed, peak and average heart rate for DP was significantly (p<0.01) greater than PP (70.2±11.5m vs 29.5±11.0m, 11.3±1.8 kmoh-1 vs 8.0±2.0 kmoh-1, 4.2±0.7 kmoh-1 vs 1.8±0.6 kmoh-1, 172.1±13.1 bpm vs 147±19.3 bpm, 132.3±19.4 vs 152.4±15.4 bpm respectively).

Discussion: The results of this study suggest that careful start of SSP exercise at the beginning part of the training session, because physiological stress tends to be higher in DP than PP. Considering the difference between the positional roles in SSP exercise, coaches should control exercise intensity by manipulating rules and pitch size.

P09.08
Performance changes after two anaerobic training regimes in soccer players
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The aim of this study was to compare the effects of two anaerobic training regimes on high-intensity intermittent exercise performance evaluated by the Yo-Yo Intermittent Recovery Test level 1 (YYIR1) and 2 (YYIR2). During a 8-12-wks in-season period, nineteen sub-elite soccer players (age 24±5 years, height 177±7 cm, body mass 75±5 kg) performed either repeated sprint...
(RS; n=9) or speed endurance production (SEP; n=10) training twice a wk. RS training consisted of 2-4 sets of 6x5-s sprints followed by 10-15 s of passive recovery, whereas SEP training was characterized by 6-8x20-s all-out efforts interspersed with 120 s of passive recovery. After the training period, both RS and SEP group improved significantly YYIR1 (RS: 2236 vs 2480 m; SEP: 2248 vs 2580 m; p<0.001) and YYIR2 (RS: 911 vs 1078 m; SEP: 904 vs 976 m; p<0.01) performance. According to a statistical approach based on the magnitude of change, RS induced possibly greater changes in YYIR2 performance than SEP, whereas differences in YYIR1 changes were unclear. Thus, the present results show that high-intensity intermittent performance was improved after both RS and SEP training. However, in contrast to the YYIR1, where no differences were observed between the groups, in YYIR2, the RS training-induced changes seem to be possibly greater compared to SEP. A plausible explanation could be that the RS protocol induced a higher improvement in the anaerobic energy system, which is taxed to a larger extent during the YYIR2.

P09.09
Effect of a typical pre-season on anthropometric, aerobic and biochemical parameters in Brazilian futsal players

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Pre-season training is an important period for preparing the athletes to the competitive season. The aim of present study was to describe the effects of a typical pre-season training period on anthropometric, aerobic and biochemical parameter in Brazilian futsal players. Ten Brazilian professional futsal players were monitored during 3 weeks of the typical pre-season. Anthropometric parameters were determined by Dual-energy X-ray absorptiometry, aerobic capacity (AT) by lactate minimum test in the specific circuit to futsal and arterial blood was collected in both situations after 24h of rest. The weekly training load was assessed using rating of perceived exertion from (RPE) and calculation of the training impulse (Trimp). The t-student test and one-way ANOVA was used to compare the results between the weeks. The weekly mean volume were 480, 720 and 840min and the mean RPE were 4.5±0.7a.u 4.2±0.6a.u. and 4.0±0.6a.u. respectively each week. Trimp average was increased (P<0.05) during the period (306.9±13.7a.u.; 441.4±33.7a.u; 503.4±51.0a.u. respectively). Bone mineral content and lean mass was also increased (0.9±1.1%, P<0.05 and 4.9±3.4%, P<0.05, respectively). Fat percentage was reduced (18.8±5.4%, P<0.05). However, the AT (pre=7.6±0.5km.h⁻¹; post=7.7±0.6km.h⁻¹) did not change. C-reactive protein (pre=3.74±3.5mg.dL⁻¹; post=0.8±0.7 mg.dL⁻¹), lactate dehydrogenase (pre=452.4±28.8U.L⁻¹; post=375.8±51.4U.L⁻¹) and creatinine (pre=1.1±0.2mg.dL⁻¹; post=0.9±0.1mg.dL⁻¹) were significantly reduced, however, the creatine kinase (pre=241.2±93.1U.L⁻¹; post=375.8±176.22U.L⁻¹) had a significate increase (p<0.05). The pre-season training alters anthropometric parameters and metabolic stress markers. Importantly, aerobic
capacity determined from lactate measurements were unaltered. Thus, it is of importance to develop more efficient pre-season training regimes that will also enhance aerobic capacity.

P09.10
High intensity training in soccer: does the order of exercises affect responses?
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Background: Small-sided games (SSG) and high intensity training (HIT) are commonplace in soccer training. It is unknown whether a certain training order induces a greater physical and perceptual response. The aim of the present study was to examine whether the order of endurance training affects heart rate and rate of perceived exertion in youth soccer players.

Methods: Eight trained male youth soccer players participated in the study (mean±SD age: 16.9±0.9yrs). Participants performed 2 times 3 configurations of SSG and HIT training organisation over a 16-week period. Scenarios consisted of 1:SSG,HIT,SSG,HIT, 2: SSG,SSG,HIT,HIT, and 3: HIT, HIT, SSG,SGG. The SSG comprised of 3vs3 for 2x4 min with a 2 min passive recovery in a pitch area of 20x25m. The HIT comprised of 2x4 min (30/30sec) at 95% of test performance (30-15 intermittent field test) with a rest period of 2 min .Heart rate and rating of perceived exertion (RPE) were recorded and player load calculated (RPE x minutes) for all sessions. Statistical analysis was performed using a one-way ANOVA.

Results: Average training intensity (%HRmax) was 82.8, 82.6 and 82.1 % and player load (AU) 60.5, 72.9, and 64.6 for scenario 1, 2, and 3, respectively. No significant differences were found between the different training organisation.

Conclusion: It appears that the manipulation of endurance training organization does not affect heart rates and rate of perceived exertion in youth soccer players. Soccer coaches may design training sessions without specific concern about training order for the selected exercises.
P10.01
Analysis of teamwork statistical parameters as a key success factor of youth players' development
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Information about talented youth players more easily obtainable. We saw a lot of talented youth player who expected to become a star when they called by senior national team, and it is not few who’s finally failed to shine. One of the causes is the difference of the tactical approach in the junior level and senior level, particularly the process to create a goal. Our research is from Indonesia National U-19 team and Indonesia Senior team. From the same match, we use linear regression and correlations method, total goal scored as dependent variable. Total successful passes and successful dribble as independent variable. With confidence level 95%, we get a result that successful dribble influenced the goal process with the Pearson correlation reaching 70% meanwhile successful passes influenced 45% the goal process for Indonesia National U-19 team. Whilst Indonesia Senior Team, the successful passes more influenced the goal process with the Pearson correlation is about 76% rather than successful dribble influenced only 39%. Successful passes is the reflection of good teamwork. Meanwhile, successful dribble more identic with the individual game play. From this analysis, can be concluded that the quality of Indonesia National U-19 Team players more affected into total goal scored, whilst in senior level team work is more affected. Hence, the main ability that cause youth player to be success is to change the individual game play into teamwork.

P10.02
A quantitative analysis of penalty kicks in the English Premier League
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Penalty kicks during a soccer match provide the attacking team with a goal scoring opportunity. Despite their importance to match outcome, objective data on penalty kicks, success rates and the influence of other factors is scarce. The aim of this study was to conduct a quantitative analysis of penalty kicks across five seasons of the English Premier League. Every penalty kick awarded between the start of the 2009-10 and end of 2013-14 seasons were analysed. There were 38 matches per season across 20 teams, making a total of 380 matches per season. Data was collated for frequency, success rate, unsuccessful outcomes, and match, team and taker characteristics. There
were 97 (SD = 11) penalty kicks per season, or one every four matches. A goal was scored in 79.5% of those penalty kicks, whereas 20.5% were unsuccessful. The goalkeeper saved 16.2% of all penalties, whereas 1.0% hit the frame of the goal and missed, and 3.3% missed the goal and frame completely. More penalties were awarded in earlier seasons, the second half, later in the match, to home teams, and to teams who were drawing when compared to later seasons, the first half, earlier in the match, away teams, and teams who were winning or losing. More players who were right-foot dominant or older took penalties compared to left-foot dominant or younger players. Objective data on penalty kicks and the influence of key factors can help coaches plan their tactics for this key part of the game.

P10.03
The features of attacking tactics in UEFA EURO 2012
Tatsuro Takenaka
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UEFA European Football Championship is the most major championship in modern soccer. So we can see development of modern soccer in it. The purpose of this study is to analysis the features of attacking tactics in UEFA EURO 2012. We extracted effective attack sequence from 31 games in UEFA EURO 2012. 1120 effective attack sequence was extracted, we categorized them by 3 specification: 1). Onset point of the attack, 2). Number of the passes, 3). Duration of the attack. We used a chi-square analysis about the date. About the onset point of the attack, the sequence started in middle third area and central area were significantly higher. Significant difference was recognized between the duration of the attack, number of passes and the number of the effective attacks. 264 sequences were required for 5-9 seconds. It is the highest number of all category. And when the attack sequence require over 10 seconds, the number tend to decrease. In conclusion, although onset point of the attack tends to be far from the goal, most attacks required in 9 seconds and they were finished within three passes in an attack sequence. Therefore, it became clear the need of carrying a ball quickly to the goal even if it started an attack at the far point from the goal. It was suggested that the fast break had been the effective attack tactic in modern soccer.

P10.04
Match-performance analysis of world-leading women’s football. Match-up between the United States and Japan
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Waseda University, Faculty of Sport Sciences, Nishi-Tokyo, Japan

In recent years the women's football is developing rapidly. The United States and Japan faced each other in the final match of Women’s World cup 2011 and London Olympic Games 2012. Thus the two nations have succeeded in the world. However a several studies have accomplished the assessment of team match performance in women's football. • The purpose of this study is to clarify the characteristic of the attack from the perspective of pass performance in national teams of Japan and the U.S. Another aim is to examine the transformation of their tactics and strategy of both
teams from a world championship to the next one. In this study, four games, two finals of World Cup & the Olympics and two friendly matches, that both teams faced each other were analyzed. Based on the videotaped games, the trace of the ball was digitized. The category of the play and the number of each player were also classified. From digitized data, pass length, pass number, the angle of each ball movement, the number of each play, and the number of play on each player were classified. The results showed a difference to the distance and the number of passes in both teams. It was suggested that team match performance was reflected by the performance of the attacking pass. In addition, compared to Japan which adopted a similar attack strategy in two world tournaments, it was considered that the U.S. had tried the transformation of the attack strategy between two championships.

P10.05
Comparative study of the number of players participating in team possessions of the semi-finalists of the 2014 FIFA® World Cup

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The aim of the present study is to compare the number of players participating in team possessions of the four semi-finalists of the 2014 FIFA® World Cup. The sample comprised 2372 team possessions performed by the four semi-finalists (Germany, Argentina, Netherlands and Brazil) of the 2014 FIFA® World Cup. Descriptive analysis was performed, as well as the Kolmogorov-Smirnov normality test. Mann-Whitney test was performed to compare the mean number of players (NP) who participated in the team possessions between each one of the teams. The significance level was set to p<0.05. SPSS (Statistical Package for Social Sciences) version 22 was used for statistical procedures. Results demonstrated that the teams who reached the final (Germany and Argentina) obtained higher means of NP in relation to the teams who were eliminated in the semi-finals (Netherlands and Brazil). (p<0.001). It is concluded that the teams who reached the final possibly displayed during the competition a predominantly offensive style with constant support and covering through the high number of players participating in the team possessions, and thus making this variable (NP) a potential predictor of success in this competition. Keywords: Match Analysis, Soccer, World Cup.

P10.06
Fractal analysis of football games in Indonesian super league

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The dynamic of football action in every games becomes a challenge for scientist to describe the whole ninety minutes game in one prediction model. This research deals with the challenge by using fractal analysis approach. As the method broadly appears in numbers of scientific literature from many discipline, the authors choose to assessing football action by evolve data characteristics.
from three main football moments; in possession of the ball, when the opponent is in possession of the ball, and transitioning. Those three moments defined as a root to derive complexity from more detail characteristics in each moment. The data gathered from minutes by minutes of the game. As an instance, this research collects data in Indonesia Super League 2014 matches from Persib Bandung who won the title. 20 random matches used to assembling the model. This model simulated to another Persib Bandung matches outside the 20 from the same season on the league. The result of probability range between 60 to 80 percent conclude this model could become one of the solutions to the game prediction modelling. Data distributions become concern as the main contributors to the higher accuracy.

P10.07
Comparing the number of passes between the four top teams at the 2014 FIFA® World Cup
Henrique Vianna, R Santos, I Teoldo da Costa
Centre of Research and Studies in Soccer, Universidade Federal de Viçosa, Brazil

The present study aimed to compare the number of passes performed by the four semi-finalists of the 2014® FIFA World Cup. The sample comprised 2372 team possessions of the 4 semi-finalists (Germany, Argentina, Netherlands and Brazil) of the 2014 FIFA® World Cup. Descriptive analysis was performed, as well as the Kolmogorov-Smirnov normality test. Mann-Whitney U was used to compare the mean number of passes in the team possessions of each team. Significance level was set to p<0.05. SPSS (Statistical Package for Social Sciences) version 22 was used for statistical procedures. Results displayed that the teams who reached the final (Germany and Argentina) obtained higher mean number of passes in relation to those who were eliminated in the semi-finals (Netherlands and Brazil) (p<0.001). Besides that, the winner team (Germany) performed a significantly higher number of passes in relation to Argentina, Netherlands and Brazil (p=0.033, p<0.001 and p<0.001, respectively). From these results, it is possible to infer that there is a possible difference in the offensive playing methods between the teams. Also, it was possible to observe that a style with more passes per possession and therefore slower was more effective than more direct styles, with lower number of passes.
Keywords: Soccer, Match Analysis, Number of Passes.

P10.08
Short-term peak intensity periods in top-class football games cause fatigue
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Objectives: To examine peak intensity periods in top-class football.
Methods: Match analyses were performed on twenty-five top-class male football players from the English Premier League (EPL) during official games. High-intensity running (HIR; >14 km·h⁻¹), very-high-intensity running (VHIR; >17 km·h⁻¹) and sprint (SPR; >21 km·h⁻¹) distance in EPL-
games was assessed using a multiple-camera approach. The players were observed during 15±3 games (373 individual observations) and data were analysed in 1, 2 and 5-min intervals.

Results: Average peak 1 and 2-min running distance during a game at HIR, VHIR and SPR were 98±3 and 138±4, 75±2 and 98±3, 52±1 and 63±2 m, respectively. In the 5-min periods following the peak 1-min periods HIR and VHIR distance was 16.5 and 16.7% lower (P<0.05), respectively, than the average 5-min HIR and VHIR distance of the game. Moreover, in the immediate 5-min interval after the peak 2-min periods HIR and VHIR distance was 9.1 and 22.8% lower (P<0.05), respectively, in comparison to the average 5-min HIR and VHIR game distance. In contrast no difference was between SPR distance in the 5-min following peak 1 and 2-min SPR intervals compared to the average SPR 5-min distance of the game.

Conclusion: Peak intensity 1 and 2-min periods in a top-class football game reduces high intensity running distance in the following 5-min interval. Thus, the most intense 1 and 2-min period of a game appear to cause temporary fatigue development.

P10.09
The effect of performance indicators on the time the second goal is scored in football matches
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Introduction: The aim of this study was to identify the performance indicators that influence the time of the second goal scored in a high-level football match according to the match location and scoreline.

Methods: A total of 240 matches of the Portuguese Premier League played in 2009/10 season have been analysed. Time of ball possession, shots on goal, set plays, disciplinary sanctions and substitutions were selected as predictor variables and entered into the Weibull hazard model to analyse how the hazard of the second goal scoring changes with time according to the performance indicators, match location and two different scorelines (i.e., winning by 1 goal and losing by 1 goal). The model was fitted using the survreg function of the R package version 2.37-7. All statistical analyses were carried out using Software R, version 3.0.2.

Results: The results showed that when home teams were 1 goal up, set plays (p < 0.05) and substitutions (p < 0.05) had a positive effect on the time of the second goal scored, increasing the probability of the second goal of a match being scored. When home teams were 1 goal down, the greater ball possession (p < 0.05) accelerated the time of scoring of the second goal by these teams.

Conclusion: Our findings suggest that performance indicators that influence the time when the second goal is scored are different for home teams that scored and conceded the first goal of match. Therefore, the scoreline should be considered in the performance analysis in Football.

P10.10
The effectiveness of CD(Combinational Defence) with defender(s) and goalkeeper in soccer
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The association between defender and goalkeeper is able to affect the defending strategy as much as the existence of variety on depending situation. Especially, the locations and movement when a shooter made a shot in front of goal area always were considered in coaching process. This study, therefore, aimed to analyse the results of differences of combinations among the shooter, defender and goalkeeper when the shots made during a game. Euro 2012 matches were analysed with designed categories of combinational defence and the data was evaluated in frequency analysis and Chi-square comparisons. As results, firstly, there were differences of positional changes by defender(s) depending on the movement of shooter (p<.05), but it was also depending on nations in Euro 2012. Secondly, the shots on target were appeared in spite of the approaches by defender to the shooter were found. Thirdly, the goal made when the direction of movement by defender was to the shooter instead of side directions such as left or right direction (p<.05). Consequently, the Combinational Defence is essentially required in training sessions, but it would be carefully taught based on the side directions of movement by defender(s) and goalkeeper.

P11 TESTING - PART II

P11.01 Determining the influence of 30-day training break on anaerobic capacity in young football players with the Wingate test

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(4) University of Physical Education, Krakow, Poland

Objectives: The effect of a break in regular athletic training on the level of selected motor and energetic capabilities of an athlete is rarely investigated with respect to team game players. The purpose of study was to evaluate the impact of 30-day training break between the end of the league game season and the start of preparations for the next season on the level of anaerobic capacity in a group of soccer players aged 16–17 years by means of the Wingate test.

Methods: The participants (n=15) were soccer players with training experience of 7-8 years (age 16-17 years, height 177±2.45 cm, body mass 65±3.26 kg). To evaluate their anaerobic efficiency, they performed the Wingate test (Cyclus 2 ergometer, RBG, Germany). The experiment was conducted right after the end of the league game season and in the first week of preparations for the next season.

Results: All ergometric parameters investigated in the Wingate test were found to have decreased. MAP decreased by 3.41% (p<0.05). Total work during 30-second exercise also diminished statistically significantly (p<0.01), by 2.57%. The fatigue index increased against that recorded directly after the game season, pointing to a faster declining level of maximum power during exercise performed after a training break (by 4.31%, p<0.05).
Conclusions: The experiment’s results showed that MAP and anaerobic capacity determined from the sum of total work decreased by respectively 3-5% and 2-3%. A 4-week training break does not change statistically significantly anaerobic metabolism activation during maximal effort exercise of 30-sec - ΔLA.

P11.02
The influence of physical exercise on the amount of changes in simple reaction time in soccer players
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Objectives: The soccer-specific physiological demands require players to be physically fit in terms of aerobic and anaerobic capacity and quick reactions. The purpose of the presented study was to establish how physical effort affects the amount and direction of changes in simple reaction time in soccer players, as well as the dependence between the indicator of aerobic capacity and the direction and range of changes in simple reaction time.

Methods: The participants (n=23) were players in the Polish soccer premier division (age 24±3.2 years, height 183±6.2 cm, body mass 75±5.3 kg). In participants performing a running incremental exercise test (2 km/h every 3 min from 8 km/h, treadmill Saturn, Cosmos, Germany), VO2, VE, HR (K4B2 Cosmed, Italy), reaction time (FiTRO Agility Check, Slovakia), LA (Biosen-C, EKF, Germany). The ventilator (VT) and lactate (LT) thresholds were determined (Cheng et al. 1992).

Results: The tested soccer players’ was mean VO2max-63.22±5.12 ml/kg/min, VO2AT-55.61±5.73ml/kg/min and LT-44.91 ml/kg/min. Mean reaction times before and exercise were respectively 0.21±0.028 s (0.17-0.28) and 0.23±0.033 s (0.18-0.29). The difference of 0.2 s (not significant). Nor was there found a statistically significant correlation between simple reaction time measured after exercise and VO2max, VO2AT and VO2LT.

Conclusions: Physical exercise has an insignificant effect on delaying simple reaction time. The lack of statistically significant correlation between reaction time and the exercise test parameters shows that in players with VO2 at AT and LT of respectively 8.91% and 71.11% VO2max running intensity does not influence the simple leg reaction time.
P11.03
Differences in elective response among expert and non-expert footballers

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(3) FCDEF, Coimbra University, Coimbra, Portugal
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(5) FC Porto, Porto, Portugal

The existence of continuous changes in the game situations during the competition, makes that the perceptive processes and decisional together with the execution of the appropriate answers, highlight at the moment as capacities that center the interest during the training and the investigation in soccer.

We have developed a protocol to allowed us to appreciate the evolution of the yield of expert footballer and non-experts before the continuous exhibition to election situations, and to know the effect caused by the presence of perceptive and decisional situations with the necessity of responding to them with real actions.

This application, allows to show images of game situations and to execute adjusted answers to the same ones, allowing to register and to store the reaction times, movement time and response time used by the footballer.

Each player made 80 reps in 4 blocks. The first block like adaptation to the system that he should carry out during the test. The participants were 109 subject (60 non-expert players and 49 expert older than 19 years) and they answered to the questionnaires of RPE and perceived difficulty, as well as to the questionnaire of personal data.

We have proven that significant differences existed in reactions times, response times and the players’ efficiency in all blocks. The expert footballers are quicker and more efficient than non-experts in task of time of elective answer, being due these differences to the cognitive processes related with the perceptual and decisional capacities and not to those of execution.

P11.04
Test-retest reliability of peak speed and the critical time for recovery

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Peak speed (SPEAK) and the critical recovery time (tcrit) determined within a modified repeated sprint ability test (RSA) seems to offer valid predictions of demanding capabilities to sprint fast and to sustain at higher running speeds during the match. Complementary, test-retest reliability of SPEAK and tcrit were evaluated in this study. 13 male soccer players (178 ± 6.7 cm, 72.8 ± 8.3 cm, 24.1 ± 1.6 y) performed modified RSA-Tests twice separated by 7 days. Test conditions were highly standardized. The RSA-Test comprised 13 maximal 2x20 m sprints divided by a 180° turn. The recovery time between sprints decreased from 130 sec to 20 seconds. SPEAK was derived
separately for the total, the 1st and the 2nd 20 m section of each sprint. tcrit was determined at the
critical time where a significant decrease in sprint performance was evident. Discrepancies in
SPEAK and tcrit between tests were quantified by absolute and relative differences within a range
of 1.96 standard deviations. No systematical difference of statistical significance was evident
between tests. Absolute differences in SPEAK ranged within 0.10 and 0.32 m∙s⁻¹. The
lowest relative differences were found for the 2nd section of the 20 m sprint (± 1.5%). Absolute and
relative differences in tcrit were respectively ± 5 sec and (± 7.7%). SPEAK and tcrit respectively,
represent reliable indices if possible biases of ± 1.5% and ± 7.7% are considered. Taking into
account the predictive potential of SPEAK and tcrit, the assessment of both indices is
recommended.

**P11.05**

**Relationship between test speeds to evaluate the ability to perform intense performance in
soccer players**

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(2) State University of Campinas, Department of Sport Sciences, São Paulo, Brazil

The objective of this study was to evaluate the repeated sprint test to discriminate the ability to
maintain performances of the intense action in soccer: i) relationship between tests (Study 1), and ii)
difference performance between tactical functions (Study 2), in trained soccer players. Twenty-six
Brazilian elite soccer players performed four seasonal tests: the speed test of 30 meters (ST30),
Bangsbo Sprint Test (BST), the Yoyo Intermittent Recovery Test Level 1 (Yo-Yo IR1) and the
Yoyo Intermittent Recovery Level 2 test (Yo-Yo IR2). The speed applied in Yoyo IR1 tests, Yoyo
IR2 and Bangsbo Sprint Test were associated with 30 meters (26.81 ± 1.12 km / h), with regression
analysis indicated that the best predictors for maintain maximum speed in both tests were together
(R² = 0.896, p = 0.0003). Midfielders performed better compared to the defenders and attackers
(ratio F = 4.147, p = 0.001) in all tests. In conclusion, BST tests, Yoyo IR1, IR2 Yoyo best explain
the maintenance of the maximum speed in the soccer together, midfield show high values during
testing.

**P11.06**

**Effect of the recovery time between sprints during soccer matches**

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(3) Faculty of Medicine and Dentistry, University of The Basque Country (UPV/EHU), Bilbao,
Spain

Introduction: There are different protocols of recovery time in the repeated sprint ability (RSA) tests
(10-180 s). However, this time may determine the performance of the subsequent actions of
maximum speed. Therefore, the aim of this study was to determine the effect of the recovery time after the first sprint on the performance of the following sprint.

Methods: 21 male players (20.9±1.7 years; 1.80±0.05 m; 73.1±5.3 kg) from the Athletic Club (2nd division, Spanish League) participated in this study. The Ethics Committee of the UPV/EHU approved this study and all players signed the informed consent.

During 9 preseason matches the sprints (>21 km/h) were measured using a GPS device (SPI-Pro Elite, 15 Hz). The recovery time between the first and second sprints were classified into 4 ranges (Table 1). The duration of the sprints (s), maximum speed (km/h), distance (m) and recovery time (s) were measured.

Means, standard deviations and percentage change were calculated. U-Mann Whitney was performed using SPSS (v20). The level of significance was set at p < .05.

Discussion: During the 10-30 s recovery period the performance of the second sprint was affected, maybe due to actions of lower speed. Therefore, there should be a consensus on the recovery time of the RSA tests and it should be adequate to the game model.

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P11.07
Evaluation of Yo-yo Intermittent Recovery Test (Level 1), and sprint tests parameters of soccer players

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Introduction: The purpose of this study was to determine the relationship between yo-yo intermittent recovery test (level 1) and sprint performances (10m, 20m, 30m sprint and agility505 test) of the soccer players.

Methods: 20 male soccer players of Eskisehirspor u17 team voluntarily participated in this study. Each player performed 3 sprint conditions for each sprint (10m, 20m, 30m) distance. The best values of the sprints were recorded. Players also performed agility505 test. The agility505 test is particularly useful as it tests the agility of a player who is already moving at speed. Sprint time test and agility505 test performed via Sport Expert MPS 501 (Tuner Electronic, Ankara, Turkey) system. Players performed the Yo-Yo Intermittent Recovery I (YIRT1) test to determine endurance performance. The relationships were tested with Pearson correlation.

Results: The average yo-yo test speed and accumulated distance of the players was 16.03±0.57sec and 1614.00±324.60m respectively. 10m, 20m, and 30m sprint time of the soccer players was 1.65±0.05 sec, 2.92±0.08 sec, 4.10±0.10 sec respectively. The average agility505 test time was 2.50±0.09sec.

Conclusions: It is concluded that yo-yo intermittent recovery test and sprint time parameters can analyzed in male soccer players. In this way, the speciality of soccer’s different performance parameters can be identified. In conclusion, there are no significant relationship between YIRT1 performance and neither sprint nor agility test (r= 0.44, r= 0.52, r=-0.75, r=0.80; p > 0.05).

P12 TRAINING - PART II

P12.01
An evaluation of the in-season micro-cycle planning for elite NFL players

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Purpose: To quantify training loads (TL) of National Football League (NFL) players during a typical NFL training week.

Methods: TL was quantified by multiplying the Players’s RPE (from a 1-10 Likert scale) by the duration of practice in minutes. Seven positions were evaluated - Wide Receivers, Tight Ends, Running Backs, Offensive Linemen, Linebackers, Defensive Linemen, and Defensive Backs. A typical week consisted of one recovery session, one day off, three days of practice, and one walk through practice, to review game strategy. Game -4, game -3, and game -2 were the only days where RPE was recorded. A Kruskal Wallis test was used to evaluate the effect of TL between
Training Days and Position Groups. A Mann-Whitney post-hoc test with Bonferroni correction was used to evaluate any significant relationships.

**Results:** A significant difference was seen between each training day (p <.01) with game -3 being more intense than game -4 (p < .05, ES = .18) and game -2 (p <.05, ES = .52). Game -4 was also more intense than game -2 (p < .05, ES = .35). A significant difference was observed between Defensive Backs and Wide Receivers (p < .05). No differences were observed between other positions.

**Conclusions:** A weekly periodization of training was observed, where by game -3 was the most intense session of the week. Differences in TL were seen between Defensive Backs and Wide Receivers, indicating positional differences in training load.

**P12.02**

**Effect of recreational football on aerobic fitness: a systematic review and meta-analysis**

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The objective of this study was to perform a systematic review and meta-analysis of the literature to determine the effects of recreational soccer on maximal oxygen capacity (VO2max). Six electronic databases were searched for original research articles. A manual search was performed using following key words: recreational small-sided games, recreational football, recreational soccer, street football, street soccer, effect, maximal oxygen uptake, peak oxygen uptake, cardiorespiratory fitness, VO2max. The inclusion criteria were divided into four sections: type of study, type of participants, type of interventions and type of outcome measures. Eighteen studies met the inclusion criteria and were included in the systematic review and meta-analysis. Mean differences showed that VO2max increases by 3.61 mL·kg⁻¹·min⁻¹ (95% CI: 3.07–4.15) over a recreational soccer training programme in comparison with other training models. The meta-analysed effects of recreational soccer on VO2max compared to the controls of no exercise, continuous running and strength training were most likely largely beneficial (effect size 1.7; 95% CI: 0.93–2.40; I² = 88.35%), very likely moderately beneficial (effect size 0.75; 95% CI: 0.18–1.30; I² = 69.13%) and most likely largely beneficial (effect size 1.8; 95% CI: 0.90–2.70; I² = 71.06%), respectively. In both men and women, the meta-analysed effect was most likely largely beneficial (effect size 1.2 for men and 1.3 for women) compared to the controls. Recreational soccer produces large improvements in VO2max compared to strength training and no exercise, regardless of the age, gender and health status of the participants. Furthermore, recreational soccer is better than continuous endurance running, albeit the additional effect is moderate. This kind of physical activity has great potential for enhancing aerobic fitness, and for preventing and treating non-
communicable diseases, and is ideal for addressing lack of motivation, a key component in physical (in)activity and immature levels of social habits.

P12.03
Is rate of force development related to hop performance in trained soccer players?
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(2) School of Physical Education and Sport Science, National and Kapodistrian University of Athens, Athens, Greece

Objective: Rate of force development (RFD) has important functional consequences associated with performance improvement and injury prevention. The aim of the study was to identify whether a relationship exists between RFD and single leg hop performance.

Methods: Twenty-two trained male soccer players (age: 24.4±3.5 y, weight: 72.7±9.8 kg; mean±SD) performed 3 maximal isometric knee flexion and extension muscle contractions. Rate of force development was assessed while seated with knee flexion at 70° with efforts separated by 30 sec rest. Contractile RFD was defined as the slope of the moment–time curve in incrementing time periods of 0-30, 0-50, 0-100, 0-150 and 0-200 ms from onset of force. Single leg countermovement jump (CMJ) was performed 30 mins before RFD testing on the same day. Pearson correlation coefficient (r) was used to determine the relationship between RFD and hop performance.

Results: Reliability was high (r= 0.84 for CMJ and 0.67 to 0.73 for RFD measures). The relationship between CMJ and RFD ranged from r= -0.06 (ns) to 0.44 (p<0.05) for the right leg and r=0.25 (ns) to 0.57 (p<0.01) for left leg, respectively. The correlation was significant at RFD 0-200 ms for the right leg and RFD 0-50, 0-100, 0-150, 0-200 ms for the left leg.

Conclusion: The RFD at longer time periods showed a moderate relationship with hop performance in both legs. Developing RFD may have a positive effect on the ability to hop and should be a focus of training.

P12.04
Training intensity in elite junior soccer: typical week analysis
Antonio Gualtieri, D Ferrari Bravo, R Sassi,
Juventus FC, Turin, Italy

Objectives: To describe Training Load (TL) and its weekly distribution in typical in-season weeks in elite U17, U16 and U15 soccer players.

Methods: In-season session-RPE data (arbitrary units – AU) from September to December were analyzed for total (week) and weekly TL distribution in U17 (weeks=15), U16 (15), U15 (18) (total subjects = 96). Only 6 training days + 1 match day typical weeks were considered for players who took part at all training sessions (TS) and at least at 80% of match duration. All data are mean±SD. One way ANOVA (p<0.05) and Bonferroni post-hoc test were performed.

Results: Weekly TL: U17=2753±213AU (RPE=5.4±0.5), U16=2432±347AU (RPE=4.6±0.5), U15=1832±177AU (RPE=3.6±0.3). All differences between groups were significant (p<0.05) in TL
and RPE, no differences were found in exposure. Weekly TS number and distribution was the same in all age groups and consisted in 1 TS on Tuesday (day1), 2 TS on Wednesday and Thursday (day2 and day3), 1 TS on Friday (day4) and 1 match on Sunday (day5). Daily TL: day1: U17=477±84AU, U16=405±74AU, U15=351±70AU; day2: U17=630±122AU, U16=631±164AU, U15=455±44AU; day3: U17=572±114AU, U16=494±119AU, U15=380±82AU; day4: U17=367±85AU, U16=299±54AU, U15=221±54AU; day5/match: U17=707±74AU, U16=604±96AU, U15=436±81AU.

Conclusions: Higher TL in older players was explained by an higher intensity (RPE) and not by a different exposure. Daily TL trend was similar between groups: higher TL were typical in day2 and day3 (double TS). Our findings are in line with the long term development strategies in sport and weekly/daily values may be useful as normative data in TL monitoring in youth soccer.

P12.05
Training intensity in elite junior soccer: weekly and match load
Duccio Ferrari Bravo, A Gualtieri, R Sassi
Juventus FC, Turin, Italy

Objectives: (1) to describe in-season weekly Training Load (TL) and (2) match load in elite junior soccer players (U19, U17, U16 e U15).

Methods: In-season session-RPE (arbitrary units - AU) from September to December data were analyzed for weekly TL in U19 (weeks = 20), U17 (25), U16 (31) and U15 (29) (total subjects = 135) across 2 seasons (2011-12; 2012-13). Only players who took part at all the training sessions and at least 80% of match duration were considered. Starters TL was counted for all official games in 2 seasons (matches number: U19=62; U17=39, U16=38, U15=43). All data are mean±SD (range). One way ANOVA (p<0.05) and Bonferroni post-hoc test were performed.

Results: Weekly TL: U19=3037±341AU (2547-3772; RPE: 5.2±0.8); U17=2731±418AU (1591-3378; RPE: 5.7±0.6); U16=2284±315AU (1806-2923; RPE: 4.5±0.7); U15=1784±190AU (1414-2136; RPE:3.6±0.3). All differences between groups were significant (p<0.05). RPE values was always different but not between U19 vs U17. Exposure was higher only in U19. Match TL: U19=885±78AU (735-1082; RPE: 8.0±0.7); U17=717±106AU (409-851; RPE: 7.2±1.1); U16=600±116AU (400-858; RPE: 6±1.2); U15=444±73AU (296-585; RPE: 4.9±0.8). TL and RPE were different between all groups (p<0.05).

Conclusions: Higher TL in older players was explained by an higher intensity (RPE) and not by a different exposure. An higher exposure in U19 vs U17 determined an higher TL in U19. Our findings are in line with the long term development strategies in sport and may be useful as normative data in TL monitoring in youth soccer.
League theory: towards the theoretical development of soccer

Ali Reza Nosrati
Technical and Vocational Training Organization (TVTO), Doroud, Iran

Introduction: Modern soccer requires a theorization appropriate to expansion of accurate statistical data, that is, access to a theory that provides the best explanation in the evaluation of a team as well as the league ranking. The aim of this research is to develop an efficient theoretical framework to analyze a soccer league theoretically.

Method: The present research is an experimental and theoretical study on the results obtained in 4 major European leagues from 1998 to 2014. First, theoretical proof of the existence of a constant, $\epsilon=1.33$, in a soccer league has been shown and based on which the efficiency of each team is defined and calculated as $\mu=(pts)/(k.\epsilon)-1$, $k$: the number of matches played. Also, by factor $\sigma$ ($=1/(1+ (Ptx/Ptn)) \times points \per \match$, the performance rating of team$(tx)$, against opponent team$(tn)$, provides the rating in the special table of each league.

Findings and Discussion: Ranking of the special table is more applicable than the ranking by Elo rating. The efficiency of a team is always as $\mu <1$. The problem of a team record in several successive match was corrected by $\mu>0$. The consistency between experimental data and theoretical factors confirmed the validity of the theory.

Conclusion: based on the current researches, we can conclude that the league theory provides a scientific and valid framework and index to analyze a league theoretically. for theoretical development of the soccer, access to a comprehensive theory of the league is suggested.

Keywords: league theory, league constant, efficiency, special table, record correction
### Table 1. Special Table for Premier League

**England 2014/15**

k=20

<table>
<thead>
<tr>
<th>Rank</th>
<th>Team</th>
<th>Pts</th>
<th>*PP</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Chelsea</td>
<td>46</td>
<td>14.7</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Man City</td>
<td>46</td>
<td>15.41</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Man Utd</td>
<td>37</td>
<td>15.7</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Southampton</td>
<td>36</td>
<td>11.03</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>Spur</td>
<td>34</td>
<td>10.18</td>
<td>8</td>
</tr>
<tr>
<td>6.</td>
<td>Arsenal</td>
<td>33</td>
<td>12.71</td>
<td>4</td>
</tr>
<tr>
<td>7.</td>
<td>West Ham</td>
<td>32</td>
<td>10.21</td>
<td>7</td>
</tr>
<tr>
<td>8.</td>
<td>Liverpool</td>
<td>29</td>
<td>9.45</td>
<td>10</td>
</tr>
<tr>
<td>9.</td>
<td>Swansea</td>
<td>29</td>
<td>7.46</td>
<td>12</td>
</tr>
<tr>
<td>10.</td>
<td>Newcastle</td>
<td>27</td>
<td>11.34</td>
<td>5</td>
</tr>
</tbody>
</table>

---

k.e=20×1.33=26.6---

<table>
<thead>
<tr>
<th>Rank</th>
<th>Team</th>
<th>Pts</th>
<th>*PP</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>11.</td>
<td>Stoke</td>
<td>26</td>
<td>9.78</td>
<td>9</td>
</tr>
<tr>
<td>12.</td>
<td>Aston Villa</td>
<td>22</td>
<td>6.06</td>
<td>16</td>
</tr>
<tr>
<td>13.</td>
<td>Everton</td>
<td>21</td>
<td>6.55</td>
<td>15</td>
</tr>
<tr>
<td>14.</td>
<td>Sunderland</td>
<td>20</td>
<td>8.72</td>
<td>11</td>
</tr>
<tr>
<td>15.</td>
<td>Hull</td>
<td>19</td>
<td>4.13</td>
<td>19</td>
</tr>
<tr>
<td>16.</td>
<td>QPR</td>
<td>19</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>17.</td>
<td>West Brom</td>
<td>18</td>
<td>4.86</td>
<td>18</td>
</tr>
<tr>
<td>18.</td>
<td>Crystal P</td>
<td>17</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>19.</td>
<td>Burnley</td>
<td>17</td>
<td>6.8</td>
<td>14</td>
</tr>
<tr>
<td>20.</td>
<td>Leicester</td>
<td>14</td>
<td>2.31</td>
<td>20</td>
</tr>
</tbody>
</table>

*Pts of Performance: Win, draw (and losing) team in each match according to the opposing team pts is calculated by σ Factor:

\[ σ_{tx} = 1/(1+(Pt_{tx}/Pt_{tn}))\]

\[ σ_{tn} = 1-σ_{tx} \]
P13.02
Inertial motion analysis in small-sided games
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(1) Celtic Football Club, Glasgow, UK
(2) University of Glasgow, Glasgow, UK
(3) ASPIRE, Doha, Qatar

Introduction: The physical demands of small-sided games (SSG) remain an active area of research in soccer and achieving match play intensity by manipulating playing area or player numbers remains controversial. Using heart rate and traditional time motion analysis is well described but may be limited by short durations and limited playing areas (prohibiting steady state heart rate response or high speed running). The use of inertial motion analysis may identify the initiation or termination high intensity efforts within different SSG formats and provide information to better describe the training impulse.

Methods: 10 male elite players (age 18.4±1.2 yrs) were monitored during three SSG formats; 5v5 GK’s, 5v5 possession and a 6v4 overload. Both 5v5 games were 4 x 4 min (2 min recovery) and 6v4 were 8 x 2 min (1 min recovery). Training loads were monitored by heart rate (Polar), 5Hz GPS-IMA (Catapult) and rating of perceived exertion (RPE).

Results:

<table>
<thead>
<tr>
<th></th>
<th>SSG (GK’s)</th>
<th>Possession</th>
<th>Underload (4 players)</th>
<th>Overload (6 players)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Distance (m)</td>
<td>2178 (200)</td>
<td>2307 (162)</td>
<td>1083 (73)</td>
<td>824 (74)</td>
</tr>
<tr>
<td>Distance &gt;21 km/h^-1 (m/#)</td>
<td>28 (25)</td>
<td>72 (32)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Mean Velocity (km/h^-1)</td>
<td>6.5 (0.6)</td>
<td>7.61 (0.47)</td>
<td>7.86 (0.53)</td>
<td>5.67 (0.63)</td>
</tr>
<tr>
<td>Peak Velocity (km/h^-1)</td>
<td>24.3 (2.0)</td>
<td>22.98 (1.20)</td>
<td>17.44 (0.80)</td>
<td>15.64 (0.98)</td>
</tr>
<tr>
<td>Player Load (AU)</td>
<td>256 (44)</td>
<td>245 (22)</td>
<td>124 (19)</td>
<td>101 (11)</td>
</tr>
<tr>
<td>Player Load Slow (AU)</td>
<td>111 (18)</td>
<td>54 (6)</td>
<td>31 (5)</td>
<td>47 (6)</td>
</tr>
<tr>
<td>Accelerations # (&gt;2.78m/s^-1)</td>
<td>7 (4)</td>
<td>4 (3)</td>
<td>1 (2)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Decelerations # (&gt;2.78m/s^-1)</td>
<td>4 (3)</td>
<td>5 (3)</td>
<td>3 (3)</td>
<td>1 (1)</td>
</tr>
<tr>
<td>%HRmax</td>
<td>88.4 (3.5)</td>
<td>89.8 (3.2)</td>
<td>84.4 (4.9)</td>
<td>80.4 (4.8)</td>
</tr>
<tr>
<td>RPE (AU)</td>
<td>6.1 (1.1)</td>
<td>7.9 (0.9)</td>
<td>7.7 (0.8)</td>
<td>5.6 (0.2)</td>
</tr>
</tbody>
</table>

a - SSG > Possession; b - SSG > 4 Team; c - SSG > 6 Team; d - Possession > SSG; e - Possession > 4 team; f - Possession > 6 Team; g - 4 Team > SSG; h - 4 Team > 6 Team; i - 6 Team > 4 Team. (P < 0.001 or * denotes P < 0.05)
Discussion: Possession games have higher stimulus for aerobic conditioning (meterage, mean velocity and % maximum heart rate). Higher magnitude accelerative load is apparent in SSG, with eccentric deceleration distance and frequency greater in possession games. The team of 4 players does not differ in acceleration profiles in relative terms. The team of 6 experiences lower level loading that may be used as a lesser stimulus for recovery. Conclusion: These data suggest loading outputs are contextual and influenced by conditions implemented for different SSG formats. IMA may supplement heart rate and RPE data to discriminate between formats. Keywords: GPS, Training Load

P13.03
Quality of tactical behaviours of soccer players according to positional role
Guilherme Machado(1), M Padilha(2), I Teoldo da Costa(1)
(1) Federal University of Viçosa, Centre of Research and Studies in Soccer, Brazil
(2) University of Porto, Faculty of Sport, Porto, Portugal

The present study examines how soccer players' positional roles influence the quality of tactical behaviours. The sample comprised 268 U-17 Brazilian youth soccer players. The System of tactical assessment in Soccer (FUT-SAT) was used to collect and analyze data. It is a system used to assess the tactical behaviour of soccer players according to the ten core tactical principles of soccer, categorized into five offensive principles: penetration; offensive coverage; width and length; depth mobility and offensive unity; and five defensive principles: delay; defensive coverage; balance; concentration and defensive unity. The tactical behaviour was assessed through the percentage of success in each principle. The players were grouped according to the following positional roles: defenders, midfielders and forwards. Data distribution was verified through Kolmogorov-Smirnova's test. One-way ANOVA was performed to compare mean values between the three groups. Results displayed differences in two of the tactical principles. The defensive unity was better performed for defenders (81.31±16.99) and midfielders (77.79±17.50) in comparison to the forwards (69.71±22.97). Regarding the principle of balance, forwards (59.78±25.71) performed worse than defenders (71.03±23.71). These results are related with the specific demand of defensive and midfielder players, who are more likely to perform in the game than forwards. Consequently, it may be that defenders and midfielders had developed better know-how in these principles in relation to the tactical behaviour. Therefore, it is concluded that the quality of tactical behaviours of soccer players was influenced by their positional role.
P13.04
Contribution of effort, self-efficacy and reflection in self-regulated learning among Indonesian National Team U19 football players

Fridondy Prawira, RT Destria, H Maulana
Labbola Sports Co., Jakarta, Indonesia

This research discusses about the Self-regulated learning among football athletes. The participants in this research are 30 players of the Indonesia under-19 (U19) national team. This research uses a quantitative method, which asked the participants to fill out the SRS questionnaire. The research objective is by using SRS questionnaire by Toering, TT, Elferink-Gemser, MT, Jordet, G., & Visscher, C. (2009), researchers measure the self-regulated learning variable among the participants. The SRS questionnaire has been adapted into local language to fit the audience of the research. Based on the analysis of the research, it was found that out of 30 players, 16 players have self-regulated learning score above average of overall player. Based on the existing aspects of the SRS measurement tool, the maximum score belongs to the effort aspect and the minimum score belongs to the reflection aspect. This concludes effort aspects has most influence to performance of Indonesia U19 national players.

P13.05
Workload and recovery in starters and non-starters in women's collegiate soccer athletes

Terence Favero, K Winters, K Chandhoke
University of Portland, Department of Biology, Portland, OR, USA

The aim of this study was to characterize specific recovery behaviors in comparison workload of college women’s soccer athletes at three key points during the competitive season.

Methods: Eighteen female college soccer athletes participated in the study passed by the Human Subjects Committee. Data was collected using a points based recovery scoring guide developed from the Total Quality Recovery model. Recovery activities were scored in the following categories; nutrition, hydration, sleep and rest, relaxation and emotional status and cooldown. Data was collected during preseason, mid-season (during mid-semester exams) and just prior to playoffs. Athletes could earn a maximum of 20 pts per day and 140 points per week. Daily workload was characterized by RPE using a modified 20pt Borg scale.

Results: No differences were noted in the average number of weekly total recovery points. The results for preseason, midseason and pre-playoffs were 111.1 (1.45), 109.9 (1.76) and 117.1 (2.32) (mean + (SEM)), respectively. We did observe increases in daily athlete stress during the academic year, which was offset by improvements in nutrition, hydration and afternoon rest. Significant workload difference were observed between starters and non-starters on game day with starters averaging 16.66 to 11.85 for non-starters. Non-starters also characterized running days as a higher workload 16.62 (2.01 to 15.00 (1.13) RPE.

We demonstrated no differences in recovery behaviors for the entire team across the season, but did observe significant athlete variation in recovery behaviors. Individual recovery variation could impact overall team performance if it were to occur in key individuals.
P13.06
Relationship between balance ability and in-step soccer kick maximal ball velocity
Ali Onur Cerrah, O Ugurlu, D Simsek, G Yildizer, I Bayram, H Ertan
Anadolu University, Faculty of Sport Science, Eskisehir, Turkey

The purpose of the study was to investigate the relationship between balance ability and in-step soccer kick maximal ball velocity before and after the functional balance training of soccer players. Sixteen players randomly divided into 2 groups (Control Group: age 14.23±0.44 training age 2.83±0.71, height 160±9.91, weight 48.49± 9.64; Training Group: age 14.31±0.48, training age 2.91±0.75, height 161.69±10.01, weight 49.27±9.64). While control group (n=8) followed the regular soccer training (3 days a week), the training group (n=8) followed a balance-training program (6 weeks, 3 times per week, 35 minutes per session) before the regular training. Sport Kat 2000 testing system were used to evaluate balance performance before and after the training period. The ball velocities of both dominant and non-dominant leg were obtained from a stationary ball towards a target 11m away by Radar Gun. As a result, there were no significant relationship between ball velocities and balance ability variables in both groups before training period. However after training period, we obtained a statistical significant correlation between dominant leg ball velocity with dominant (p<0.05; r: 0.767) and both (p<0.05;r: 0.787) leg dynamic balance ability in training group. Furthermore, there was also statistical significant correlation between non-dominant leg ball velocity with dominant (p<0.01; r: 0.844) and non-dominant (p<0.05;r: 0.778) leg dynamic balance ability in training group. Results shows that six weeks functional balance training which is performed three times a week followed by regular soccer training program positively affect the both leg in-step soccer kick velocity of age 14-15 soccer players.

P13.07
Chronological age relationship with soccer in-step kick ball velocity
AO Cerrah, D Simsek, Hayri Ertan
Anadolu University, Faculty of Sport Science, Eskisehir, Turkey

The aim of the study was to evaluate chronological age (11-18) relationship with in-step kick maximal ball velocity. Forty male soccer players (5 players from each age) performed in-step kick towards a target 11 m away. Their height, body weight, kicking leg mass, instep kick ball velocity, kicking leg isokinetic strength parameters (independent variables) of flexor and extensor muscle at 60 and 180o.sn-1 were evaluated and correlated with age. The kicking leg mass was determined by the Hanavan Method. The maximal instep kick ball velocity was measured by a radar gun hold behind the goal. In order to analyse correlation between ages of soccer players with independent variables, the Pearson product-moment correlation coefficient was used. Study results showed that there were significant relationship independent variables with age development. According to Pearson Correlation scatter diagram between independent variables values with ages, the biggest gap occurred between 14-16 years old soccer players, which corresponds the growth spurt for boys in the literature. Therefore there was sufficient evidence to claim that in-step kick ball velocity increases with age development; however; the fastest increase occurs when the strength and
physical development is accelerated. Therefore, coaches should perform the technical training before age 14-16 to mature soccer players kicking technique.

P13.09

**Influence of muscular strength and power on tackling ability**

*Michael Speranza*(1), *T Gabbett*(1,2), *R Johnston*(1), *J Sheppard*(3)

(1) Australian Catholic University, Brisbane, Australia
(2) The University of Queensland, Brisbane, Australia
(3) Edith Cowan University, Perth, Australia

This study investigated the relationship between muscular strength and power on tackling ability, as well as the influence of a strength and power program on tackling ability in semi-professional rugby league players. Thirty-six semi-professional rugby league players underwent tests of muscular strength (3RM bench press, 3RM squat), and muscular power (plyometric push-up and countermovement jump). Muscular strength relative to body mass was also calculated. Tackling ability of the players was tested using video analysis of a standardized one-on-one tackling drill. Twenty-four of the players then completed 8-weeks of strength and power training as part of their preseason training before being re-tested for strength, power, and tackling ability. The strongest correlates of tackling ability were squat (r = 0.67), bench press (r = 0.58), relative squat (r = 0.41), and plyometric push-up (r = 0.56). The strongest correlates of change in tackling ability, following 8-weeks of strength and power training, were changes in 3RM squat (r = 0.60; p<0.01) and squat relative to body mass (r = 0.54; p<0.01). The players with the greatest improvements in 3RM squat and squat relative to body mass (i.e. responders) had significantly greater improvements in tackling ability than non-responding players (p = 0.04; ES ≥ 0.85). The findings of these studies demonstrate that muscular strength and upper-body power contribute to tackling ability in semi-professional rugby league players and that the enhancement of lower-body muscular strength, contribute to improvements in tackling ability.

P13.10

**No relative age effect for soccer players according to positional role**

*Felipe Moniz*(1,2), *I Teoldo*(1,2)

(1) Federal University of Viçosa, Department of Physical Education, Brazil
(2) Centre of Research and Studies in Soccer, Brazil

Relative Age Effect is described as the difference between players of the same age group that may result in differences. The Relative Age Effect has been regarded as a way of identifying the positional role of soccer players. The aim of this study was to examine the Relative Age Effect according to the positional role of soccer players between birth quartiles. The sample comprised 144 soccer players from U-11 to U-20 age groups. Players were grouped according to their birth quartiles (Jan-Mar; Apr-Jun; Jul-Sep; Oct-Dec) and positional role (Defender, Midfielder, Forward). Chi-squared test was used to compare the frequency of positional roles between the birth quartiles. Results did not display significant differences between positional roles according to birth
quartiles. Although the present study did not display significant differences, such differences between positional roles according to birth quartiles were found in soccer players in Switzerland. A possible explanation for the effect that was not found is the small sample size. Therefore, it is concluded that there is no Relative Age Effect for the sample within this study.

Keywords: Relative Age Effect, Soccer, Positional Role.
P14.01  Eye tracking in football: effectiveness of visual strategies in dribbling
Alvona Grushko
Lomonosov Moscow State University, Sport Center of Innovative Technologies & Teams Exercise Training, Moscow, Russian Federation

The research describes the possibility of applying eye tracking in football. A total of 23 male professional football players from Russia participated in research (Mean age = 21.56; SD=1.5 y.o.). Experiment was conducted in natural settings in football field. All athletes had an appropriate warm-up. Participants’ eye movement data during dribbling task were recorded via “ETG SMI”. We identify the most effective components of visual strategies during different stages of dribbling task: in pre-start routine, during dribbling, after kicking the ball into the goal. Focus of visual attention in pre-start routine: effective gaze patterns connected to the short preview of direction of future movements, quiet-eye fixation to the particular zone of the goal for entering the gate. Effective gaze behavior in dribbling linked with external focus of attention (without commenting movements or emotional reactions out loud) and anticipation in gaze focus - in limitation of time during dribbling athletes look at the space at distance of 0.5-1 meters from the ball. Period after kicking the ball into the goal: post-analysis of the kick, fixations of the gaze on goalkeeper actions. In addition, we find out that fixation duration during dribbling and quite-eye duration before kick pattern positively correlates to the shooting accuracy. These findings indicated that applying eye-tracking technologies could enhance performance of football players such as dribbling technique and shooting accuracy. Especially, via eye tracking tools scientists can investigate important issues like development of technique, sport attention, reaction time and anticipation.

P14.02  Imagery instruction, self-efficacy, and ironic rebound during soccer penalty kick performance
A McCann(1), Guido Geisler(2)
(1) University of Edinburgh, Edinburgh, UK
(2) University of Tsukuba, Ibaraki, Japan

This study examined the effects of positive and negative imagery instruction as well as player self-efficacy on penalty kick performance, with particular reference to thought suppression and ironic rebound effects. Ironic rebound denotes the process whereby thoughts, beliefs, or emotions arise more intensely upon an individual’s attempts to suppress them. Through self-report measures, 31 experienced male soccer players were identified as having high or low self-efficacy for penalty
kicks, after which they took three sets of 10 penalties each under three conditions of pre-performance instruction: (1) Positive imagery instruction (visualize yourself scoring); (2) Negative imagery instruction (visualize yourself scoring but make sure not to think about shooting wide of the target); and (3) No instruction. The findings failed to show statistical significance, but the descriptive statistics warrant mention due to their surprising nature. That is, negative imagery instruction led to the most goals scored while also producing the highest number of off-target kicks. In addition, low self-efficacy players missed the target more than twice as often under the negative instruction condition than under the neutral and positive conditions, suggesting that they could be more prone to ironic rebound than high self-efficacy participants. Given the lack of significant findings here and the mixed results in the literature, further research with larger and more diverse samples is needed to help coaches better understand the differential effects of positive and negative instruction on thought suppression and high-pressure sport performance, as well as the role of self-efficacy in ironic rebound effects.

P14.03
Visual search behaviors of soccer players in a simulated decision-making task
Takayuki Natsuhara(1), M Nakayama(2), T Kato(3), T Nagano(4), T Asai(2)
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(3) Faculty of Environment and Information Studies, Keio University, Japan
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The aim of this study was to examine whether soccer players perform any visual search behaviors when executing a tactical pass in a simulated 4 vs. 4 attacking play. Ten • expert• and ten sub-expert• soccer players watched a 4 vs. 4 attacking play on a life-size screen. These participants were then asked to accurately perform a one-touch pass to the player who thinks it is the best pass choice. Eye movements were measured during the decision-making test. After each trial, the participants were questioned regarding the on-screen pass recipient. There were no significant differences in the pass skill levels for either group. However, regarding pass execution based on tactical judgments, the expert soccer players had significantly better reproducibility and accuracy compared to the sub-experts. Concerning visual search behaviors, sub-experts had line of sight in the open space for a longer period. On the other hand, the experts spent more time fixating on the defender in the pre-ball-injection phase. Furthermore, their gaze moved toward the direct line of sight of the teammate who would receive the pass during the ball-approach phase. These findings suggest that the precise decision-making processes depend in large part on the timing and duration of gaze.
Correlation between the reaction time peripherals stimulus and maturation by soccer players

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Introduction: React quickly to stimuli during a football match can put the player at an advantage over your opponents, especially if the stimuli are peripheral. It may be that sexual maturation of individuals has correlation with the time in which players respond to the peripheral stimulus. This study aims to analyze the correlation between maturation and the reaction time to peripheral stimuli soccer players in the Under-13 category.

Methods: The sample was comprised by 18 soccer players. Mental Test and Training System (MTTS) was used to evaluate the reaction time for peripheral stimulus and the Khamis-Roche method (1994) was used to assess the maturity of the players. Descriptive analysis and statistical tests Shapiro Wilk and bivariate Spearman's correlation was performed. The level of significance was p <0.05.

Results: The results indicate negative moderate correlation (rho = -0.496, p <0.036) between maturation and reaction time stimulus to the peripheral, so that the more mature players react more quickly to the peripheral stimulus.

Conclusion: It is possible to verify that by going through the maturation process, soccer players start to recognize the peripheral stimuli faster.
P14.05
Tactical exploratory behavior in football small-sided games
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Objective: identify the time scales of the dynamics in small-sided games (SSG) settings, as well as quantifying the exploratory behaviour under different task constraints determined by the influence from the number of opponents on the short and long time exploratory behaviour.

Methods: Two teams of four professional male footballers played against two different teams who changed the number of opponents (3, 5 and 7) in SSG. Data were collect combining a systematic observation and non-differential global positioning system (15Hz). Tactical patterns of each player formed 37 (4D categories) X 360s data vectors, processed by the calculation of dynamic overlap order parameter q, entropy and trapping strength to determine the metastable action structure and the temporal diversity of the players.

Results: The dynamic overlap showed the interaction of two separate time scales, short termed and locally coherent patterns are continuously formed yielding a permanent flow of player reconfigurations in the state space, and the longer-term change coincided with defensive and offensive sub-phases of game, forming a metastable landscape of action different for each constraint. Player’s tactical diversity decreased with increasing number of opponents, mostly based on the decrease in defensive tactical patterns diversity.

Conclusions: Manipulating numerical unbalance conditions change the exploration breadth, unpredictability and flexibility of tactical solutions. In addition, the temporally nested structure of constraints shaped the emergence of offensive and defensive tactical behaviour, providing new reasoning for practice task design.

P14.06
Analysis of tactical performance according to position role in soccer
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The aim of the present study is to verify the influence of the offside rule on the tactical performance according to positional role (Forwards, Midfielders, Defenders). Tactical Performance was assessed through the System of Tactical Assessment in Soccer (FUT-SAT). We analyzed 47139 tactical actions performed by 168 U-17 soccer players (Forwards, Midfielders, Defenders) who were evaluated in a small-sized game in a field of 36m x 27m. The software Soccer Analyser, part of FUT-SAT, specifically built for the ’GK+3vs.3+GK’ test, was used to analyze the games. Statistical Analysis was performed through IBM SPSS software for Windows, version 20.0. Kolmogorov-Smirnov and Shapiro-Wilk normality tests were used to verify data distribution. T-test and Wilcoxon test were used for paired samples, with a significance level of p < 0.05. Results displayed significant statistical differences for the following variables: Penetration (Forwards), Depth
Mobility (Forwards), Width and Length (Midfielders) and Delay (Forwards). It has been concluded that, for this sample, the offside rule influenced the Tactical Performance in relation to positional role.

Keywords: Soccer, Tactics, FUT-SAT

P15 WOMEN'S FOOTBALL

P15.01
Young footballers’ intention to dope - a cross-cultural comparison between female and male elite players in the UK, Denmark and Greece

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Social science research on doping has been increasing in recent years, however, investigations about the topic in football are still rather scarce. The goal of this study was to investigate individual differences in elite footballers’ intention to dope in two different hypothetical scenarios. Participants were 1432 elite footballers from three European countries; 463 from Denmark (214 males and 249 females; mean age 21.00), 506 from UK (251 males and 255 females; mean age 18.42), and 463 from Greece (256 males and 207 females; mean age 21.82). Scenario 1 described a situation where footballers had the opportunity to use a banned substance to enhance their performance. In Scenario 2, footballers could take a forbidden substance to speed up recovery after an injury. Footballers’ intentions to dope were assessed with respect to these two scenarios. Descriptive statistics indicated relatively low intentions to dope for both scenarios in all three countries. MANOVA showed that in the UK and Denmark there were no differences between males and females in doping intentions for the two scenarios, whereas in Greece, males scored higher than females. Repeated measures ANOVA showed that in Denmark and Greece males and females scored higher in the injury compared to the performance scenario, whereas in the UK females, but not males, scored higher for the injury compared to the performance scenario. The results could be used to inform future doping prevention programs in football and suggest that doping prevention programs will profit from targeting at risk populations and susceptible doping eliciting situations.
P15.02
The female soccer from periphery to center: professionalization of women's soccer players in São Paulo city
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It's Brazilians common sense that female soccer is an amateur sport. The recurring arguments that support this position come from different points of view. Some professionals and experts of the soccer world state that the apparent lack of enthusiasm from the athletes, the poor visibility on media and the financial limitations delay the professional development of the sport. Thus, the false perception that people have about amateurism in women's soccer relegates it to the background of the sports world, of academic productions, and of journalistic coverage. Despite these discourses the soccer that I study the women are paid to play, train two periods a day, and make a living out of it. Playing soccer is a professional practice for these women. The tension between the amateur and professional categories is established right from the start. I choose as locus of research two teams from São Paulo. The first one, is located near Ibirapuera Park, downtown. The second team is located on the periphery of São Paulo, in Guaianases. It is important to remember that there are few studies bringing to the Anthropology of Sports a comparative perspective between sports practices from the center and from the periphery of the same city. The objective of this research is to describe the process of professionalization of women soccer players in São Paulo, from the contrast between the soccer played in downtown and the soccer played in the periphery, and thus rearrange the existing dichotomy between the categories of professionalism and amateurism.

P15.03
Representation and stylization: girls' and women's football in / and the Dutch media
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Although the focus on women's sports recently increases, in the traditional media men's sports get worldwide the most attention, men's soccer in particular. Nevertheless, the media attention for women's football has increased in the Netherlands, probably influenced by the doubling of the number of active female football players (137.000) and the start of a national premier league. This ongoing study focuses on the changes that have occurred in the representation of women's football and analyzes the structural factors, which influenced these changes (such as commercial interests and social/political pressure). Via semi-structured interviews with 20 sports editors from newspapers, magazines, websites and television channels relevant information has been collected about the decision making processes and mechanisms within the media. This research concentrates on a few key moments in the history of Dutch women's football, for instance the start of the women's league (2007), the performances during the European Championship 2009 and the qualification series of the FIFA Women's World Cup 2015. We have also analysed the role of social media in the developments of the portrayal of women's football by media, football organizations
and female football players. During the 8th World Congress on Science and Football 2015 I will present results on the development of Dutch media attention for women's football and the factors outside and within the production processes of the sportsmedia that facilitated these changes. One of the preliminary results is that existing (online) media women's football platforms are not very professional and don't reach large mainstream audiences.

15.04
Size of ball in women's football: influences in dribbling and kicking tasks

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In some team sports, such as basketball and handball, the size and mass of the balls are smaller for females than for males. The basis for this difference is the inherent physiological gender differences, and the fact that the technical execution is influenced by the size and mass of the balls. In soccer, ball’s adaptations to the female morphology have not been questioned until a recent study from Andersen et al. (2012). The aim of the study was to look at female adjutments to three types of ball (size 5, size 4, and indoor football) in two tasks of game (dribbling and kicking). The study is based on video observations of high-level's young female players. Training sessions were documented using a digital camerascope. The video and some relevant indicators (e.g. timing; loss of control of the ball) were selected in order to analyze some technical aspects. The observation overall show a difference between the three ball size conditions. The ball size 4 puts players in optimal conditions to technical success for both tasks. Some Interesting pictures show players in extrem conditions on their knee during dribbling with ball size 5. Andersen et al., (2012). Kicking velocity and physical, technical, tactical match performance for U18 female football players. Effect of a new ball. Human Movement Science 31:1624-1638.

P15.05
A comparative analysis of motivation levels for success among female football team players in different leagues

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The objective of research is to identify the motivation for success among female football team players in different leagues. At the same time the aim is to define the correlation between Sports Related Success Motivation drive with variables such as age, education level, number of years playing football, being in the national team and the league they play in. The researcher prepared a and administered a questionnaire in order to collect demographic profiles of female football players and as for the success motivation level Willis Sports Related Success Motivation Scale was applied. Willis scale consists of two sub dimensions. The first is related to Power Motive (POW), the second one is linked to drive for success. The motives for success consist of Motive to approach success (MAS) and Motive to avoid failure (MAF). 289 soccer female players (109 players from first league, 180 from second league) participated in this study. The t Test and the One-way Variance
Analyses results showed that among the female football players in different leagues Motive to Approach Success and Motive to avoid Failure, the 1st league football players with different national °rees the Motive to Approach Success; and among 2nd league players in different age groups the Power Motive scores have been statistically different (p>0.05).

Key Words: Football, Females, Motivation, Motivation in Sports, Motivation for Success in Sports

P15.06
The gendered play: women’s football in Turkey
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Football is the most popular sport in Turkey overwhelmingly for men and it has been historically identified with masculinity closely. Although number of women’s football players and clubs are increasing in Turkey and all around the world, women are still marginalized in the football field as a player due to the cultural significance of football in defining the particularly masculinity and femininity in Turkey. This study aims to examine the gender, gender relations and women football players’ relationship to the men’s game. This is an institutional ethnographic research which focuses on the lived experiences of women football players of Umutspor Club in Women's 1. Football League, in Turkey. Poststructuralist and feminist approaches are used to understand the effects of gender and Turkish culture on the experiences of women. The researcher participated in the field as a sport psychologist in the 2014-2015 seasons and observed the team at practices and at home/away games and out of the field. Data was collected with participant observation, field-notes and in-depth interviews to give an insight to the gender-doings and negotiations of women players. It can be said that women’s football is strongly influenced by the traditional views on women and gender in Turkey. This study contributes to the researches on women's football by examining the women football in a country which holds the traditional views on women and football.

P16 PSYCHOLOGY

P16.01
Perfectionist cognitions in soccer
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In such a competitive environment, soccer players may strive for an error free performance, and engage in harsh self-criticism when mistakes are made. Perfectionists may induce a pattern of intrusive self-focused thoughts about achieving unrealistic high standards leading to negative influence on the quality of motivation in elite junior athletes. Perfectionist cognitions can lead to heightened anxiety which can be detrimental to sporting performance. The purpose of this presentation is to define perfectionist cognitions, and highlight the nature of perfectionist thinking in line with current research. It will seek to outline the cognitive processes of different types of
perfectionists; and where these cognitions derive from. Sport psychology research indicates that the coach-created climate can add to the maintenance of cognitive mechanisms involved in perfectionism. Therefore, it may be beneficial for those working in a soccer environment to have an understanding of the cognitive processes in order to create an optimal motivational climate. Perfectionist cognitions are an important addition to research on perfectionism as they have shown differences in the debilitating factors beyond trait perfectionism. Using recent psychology research, this presentation will seek to show the negative effects of the cognitive aspect of perfectionism.

P16.02
‘I was destroying it all’: a study of the identity construction, and impact, among elite youth footballers in England
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The identity construction of elite athletes has long been considered from both performance and academic perspectives. However, much of the academic research has ‘framed’ identity by means of quantification and questionnaires. This approach is deemed unrealistic in understanding such a complex concept. The world of professional football is viewed as a challenging, dynamic and uncompromising environment wherein the attrition rate for young players, becoming professional, is around 90%. In relation to this, the importance of understanding identities in terms of players’ performance, and psychological well-being, is well documented. The present paper draws upon four personal narratives from elite youth footballers (FA National School Graduates) and adds to the growing body of research concerned with the identities formed as a result of sporting success, and the meaning individuals attach to their sporting and wider life stories as a result. The four narratives are entitled: ‘I was destroying it all’, ‘It’s what I do, not who I am’, ‘I now know what matters’ and ‘I always had a back-up’. The evocative and contextually rich stories, offer powerful insights into their careers, the impact of their early success on identity construction, and the resultant occupational decisions they made. This highlights how perceived experiences, combined with the social context of professional football, has the capacity to shape identity development and psychological well-being in young players. These novel and unique findings have practical implications in helping to shape the development of elite youth footballers through informed support strategies from both performance and well-being perspectives.

P16.03
A study of the migratory transition of elite Japanese soccer players
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In the 1998 FIFA World Cup held in France, where Japan made its first appearance, all 23 of the players who participated belonged to the J-League. However, of the 23 players who competed in the Brazil World Cup, 12 belonged to European clubs. The present study seeks to collect information on problems experienced by active professional football players playing in major European leagues, how they cope with them, the support they wish for, and so forth, and obtain basic information toward providing players who are playing abroad with knowledge and specific support. The ranks of Japanese football players currently playing in countries and regions around the world have swelled to numbers so high they cannot be fully ascertained, but in the present study, subject leagues were the first or second division of the major leagues of Western Europe where most of the world’s top-level footballers play. There were four currently active players who were interviewed as participants. Semi-structured interviews were conducted with each player. The data was analysed using the grounded theory approach. The results revealed that important factors comprised six categories, decision of transfer, anxiety, language, food, family and social support. The Japanese migratory player is required to make a significant life-changing decision, not just sign for a new club, but to move to a new country. As a consequence of this, they are required to use and converse in a foreign language, adapt to new soccer culture and playing style, build good relationships with coaches and team staff.

P16.04
Volitional skills predict attendance rates in a football training intervention
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for gaining health benefits from physical activity, regular participation and maintenance are essential. Volitional skills are important for initiating and maintaining desirable actions, and are assumed to play an important role in the adherence to regular physical activity. The aim of this study was to investigate whether participants’ volitional skills were related to attendance rates during a football training intervention. Thirty-three female healthcare workers participated in a 40 week football intervention with the possibility to train up to three times per week. During the first 8 weeks, the sessions were fully supervised, with a gradual reduction in supervision during weeks 9 to 12. Between weeks 12 to 40 the participants themselves were responsible for organizing training. Participants completed a short Norwegian version of the Volitional Components Questionnaire for the training context at baseline, and after 5 weeks. Furthermore, the number of attended football sessions was registered. The baseline value for the volitional skill ‘self-determination’ revealed a significant positive correlation with training attendance over the 40 week period (r=0.43, P=0.02). Moreover, we observed significant correlations between attendance rates and positive values on ‘initiative’ (r=0.40, P=0.04), negative values on ‘lack of energy’ (r=-0.40, P=0.04) and ‘avoiding
effort’ \((r=-0.45, \ P=0.02)\) 5 weeks into the intervention. The volitional skills ‘self-determination’, ‘initiative’, ‘lack of energy’, and ‘avoiding effort’ seem to be important for active participation in physical activity interventions. Therefore it can be recommended to develop these skills (e.g. through psychological skills training) in order to ensure the success and sustainability of football training interventions.

P16.05

“Football is my life”: a reflective account of how emotional regulation can have a positive impact on elite performance

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To be selected to become part of a Premier League Football Club, resilience is indispensable. The pressure within this environment magnifies mistakes when made and one mistake can cost you a career within the sport. This pressure extends through to the academy where players as young as nine are exposed to this demanding environment. To be able to control and regulate emotions and ‘bounce back’ is a vital attribute that coaches across age groups (U9 to first team) are looking for in all players. With this in mind, the present research reflects on how a trainee sport scientist incorporated the theoretical model Individual Zones of Optimal Functioning (IZOF) and ‘bought it to life’ to track, enhance emotional awareness, and manage emotions. Utilising a case study approach to elicit in depth rich data, exploiting the IZOF framework showed the impact it had on the player and his performance. To aid the decision of the intervention, the player eluded to his performance not at optimal peak when a mistake was made which ultimately affected his performance for the duration of the game. The case study shows how a multidisciplinary approach was used to magnify the importance of being able to regulate emotions. Monitoring the player’s emotions over a 6 week time period was a tiresome challenge, which emphasised the importance of support from coaches and support staff. The key outcome displayed, that with a case study approach it is possible to manage emotions through the daily tracking of IZOF.
P17.01
Design and explanation on rating evaluation standard of students’ football motor skills (RESSFMS) in China
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Objectives: Promote the majority of teenager students to participate in the learning and training of football through constructing and improving a motor skill evaluation system of students' football sports.

Methods: According to the corresponding theory to establish the index system and to determine the test method. Collect the original data and organize experts to examine and approve the Standards.

Results: The football motor skill evaluation indicators directly reflect the students' ability to use the common technique in courses learning, training and competition ability. The division of the skill levels should be quantified as specific as possible, and between levels is to try to be continuous. The standards of skill levels should achieve the combination of qualitative analysis and quantitative analysis. Qualitative analysis refers to the description of the football motor skills from the practical function, for each level as a behavior description; Quantitative analysis refers to the besides football course learning, training and competition of technical description along with quantitative indicators.

Conclusions: The skill level standard of football sports should comply with the needs of different levels. It should facilitate teachers to develop, implement and evaluate projects, help students obtain the feedback information and direct explanation as much as possible as well as contributing to the formulation of teaching outlines, the organization of teaching and the development of teaching materials. The unified level standard should go through the validity evaluation of qualitative and quantitative analysis after it is completed so as to prove its validity and feasibility.

P17.02
Development of evaluation methods for ball possession skills in college soccer players
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The ball possession tactic has been used by many major teams such as FC Bayern and FC Barcelona. That has been reinforced by possession training such as a small-side game and a rondo, however, varieties, importance and difficulties of possession skills have not been verified in quantitatively. Therefore, we investigated to construct the model of ball possession skills and verified the item difficulties and discrimination power of ball possession skills. First, unstructured interviews were conducted for 4 coaches who had a coaching license of Japan Football Association to construct a model of ball possession skills. We aggregated their opinions by using the KJ method in qualitatively. The model on cause and effect diagram was constructed from 34 items in 4 phases. Next, 65 college football players answered the 5-point scale questionnaire based on above model by
self-evaluation how much they could perform on these skills. These items were confirmed their difficulties and discrimination power by Item Response Theory (IRT) which was an absolute scale test development tool for recent years. The items had sufficient reliabilities and information for an absolute scale test. The item difficulties were calculated, and according to the result the support skills were easy, and the intensive lobbing control, the luring pass and the turning over pass were difficult. Player's abilities of possession skills were also sufficiently discriminated. These results can be utilized for development of stepwise coaching program for possession skills.

P17.04
Life stories of practical wisdom coaching methods used by youth team coaches at a J. League Academy who train players (former J. League soccer players)
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The aim of this study was to rethink coaching by analysing qualitative data obtained from life-story interviews focusing on practical wisdom for coaching Japanese youth soccer teams. The subjects were two professional coaches. These two coaches each majored in physical education at Japanese university and had successful careers as professional soccer players after graduating with a Bachelor’s degree. Semi-structured life-story interviews about soccer were conducted individually based on the completed questionnaire (open-ended) and were recorded using IC Recorder. Each interview lasted more than an hour. The researcher made transcripts of the audio data from the interviews and mailed these to the subject coaches so they could personally verify the content. Then, the researcher reorganised the transcript data into life stories segments including such information as communication with players, dialogue with players and advice received from coaches in the past. The reconstructed life stories were analysed by interpreting their meanings according to the overall context. The validity of the interpreted data was verified as needed by multiple researchers who specialise in the field of sports coaching. The data analysis indicated that the coaches perceived it was important to have a desire to learn from experience and practise continuous organic improvements based on the acceptance of reflective thinking in order to achieve proficiency in coaching.

The findings suggested that coaching, which is regarded as an act of a coach leading his players to the goals, has also gained new meaning as an act of a coach improving himself through practising coaching.

P17.05
The dimensions of the athlete-coach relationship in amateur and professional soccer players
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The objective of research is to identify the motivation for success among female football team players in different leagues. At the same time the aim is to define the correlation between Sports
Related Success Motivation drive with variables such as age, education level, number of years playing football, being in the national team and the league they play in. The researcher prepared a and administered a questionnaire in order to collect demographic profiles of female football players and as for the success motivation level Willis Sports Related Success Motivation Scale was applied. Willis scale consists of two sub dimensions. The first is related to Power Motive (POW), the second one is linked to drive for success. The motives for success consist of Motive to approach success (MAS) and Motive to avoid failure (MAF). 289 soccer female players (109 players from first league, 180 from second league) participated in this study. The t Test and the One-way Variance Analyses results showed that among the female football players in different leagues Motive to Approach Success and Motive to avoid Failure, the 1st league football players with different national degrees the Motive to Approach Success; and among 2nd league players in different age groups the Power Motive scores have been statistically different (p<0.05).

Key Words: Football, Females, Motivation, Motivation in Sports, Motivation for Success in Sports

P17.06

Growth model: development trends of National School Football League from a review of the campus football in China

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Objectives: National School Football League (NSFL) is collaboration organizations of school sports. Which influenced by work instruction of the national education ministry, and Tianjin University of Sports as lead unit, some school as volunteered joint part in the name of the school of colleges and universities, vocational school, ordinary high school, and primary schools. The purpose of the paper is to provide some beneficial experience for "The Campus Football" (TCF) for future construction and give a certain foundation at present of the NSFL construction.

Methods: This article makes a summary from the development process and experience of TCF for NSFL establishment. Analyze NSFL from the perspective of growth model to carry out a development trend. Find a realistic starting point for the construction of NSFL.

Results: TCF provided the construction foundation to NSF in the brand construction and promotion, system specification and experience and competition in nearly 60 years. it is a "growth model" in TCF from football courses and extracurricular training, training, competition, training mechanism, fund, teacher team construction and the football culture construction, and other areas to carry on the all-directional understanding level.

Conclusions: It was marked the beginning of TCF by Amateur Sport Schools and football class in Sports Middle School in 1956. It is a long road to go for solving problems and improving policy. From the point of NSFL development situation, democracy, rule of law, orderly and harmonious way of organization and management of innovation for juvenile football has played a certain role in China.
P17.07
Interactive object to enhance the process of teaching-learning-training of tactics in soccer: the case of Sphero™
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This study aimed to experiment the usage of an interactive object to enhance tactical external imagery, players’ tactical knowledge, and in-game tactical performance. A quasi-experimental pre-post treatment was used to compare 245 rates provided by 14 players of an Under-14 amateur soccer team in Canada. A teleguided object called Sphero™ was adapted to the context of training and was used to teach tactics. Understanding and execution of pre-game directives were evaluated through self-evaluation. Results were used to compare the tactical performance of the team after five weeks of specific training. The coach also evaluated each players according to each directive and has provided a subjective evaluation of the two games. The final scores were also taken in account. Descriptive analysis was performed to measure the means and standard deviations, and the Wilcoxon test (z) was used for paired comparison. A significance level of p <0.05 was adopted. Significant difference has been found in the execution of individual directives (z = -2.070; p = 0.038) and between coach’s rates of the execution of three directives out of four (z = -2.701; p = 0.007, z = -3.126; p = 0.002, z = -2.124; p = 0.034). Rates from both players and coach indicate both players and coach perceived they improved in the execution of tactical directives. The second game was won by a high score. Integrating imagery to training using Sphero™ has therefore allowed to improved individual and collective tactical performance through an interactive teaching-learning-training process.

P18       VARIA - SOCIAL SCIENCE AND HUMANITIES

P18.01
Narrative interview about the influence of being on the homeless national Danish football team
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Introduction: In society there is an increased attention how to construct health interventions for marginalised groups. Many of these health interventions can benefit from a football approach. This paper takes its onset in the project “Ombold” which arrange football for homeless.
Aim: How two homeless people experienced to be a part of Ombold, and how their participation on the homeless national team affected their lives. With this knowledge we seek to obtain an understanding of the instruments which can be applicable for other health projects.
Material and Method: A qualitative study based on two semi-structured interviews. The interviews are analysed through a modified version of systematic text condensation described by Malterud. Furthermore, the material is discussed on theories of Self Efficacy and Social Capital developed by Bandura and Putnam.

Results: The results are presented as narratives. Here are some short quotes from one of the players. ‘I did not have much faith in the future, because I was not able to see what I could do with my life. But when I played football, I didn’t have to do drugs'. If I could handle football, I could enrol in a job, education, and everything else.’

'I don’t want to ruin all the things that came out of my participation, drugs never should be the reason not to continue.'

Conclusion: Football has a positive effect on health behaviour and quality of life. Peters hash addiction was also reduced and he felt he has become more tolerant towards others and able to control his temper.

P18.02

Impact of established clubs on probability of survival in top leagues

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Relegation is a fundamental component of the European promotion-relegation model, were the best teams in the highest-ranking minor league are promoted to the major league and the worst teams relegated to the former. In addition, there are cohorts of established clubs that rarely get relegated from the top league; therefore the probability of clubs being relegated is not equal. This paper proposes a statistical model that calculates the probability of non-established clubs avoiding relegation. for illustrative purposes the model was applied to the English Football Premier League (EFPL) and included three items of data from the league (i.e., total number of clubs, number of established clubs and number of clubs relegated from the league) across eight seasons. The model projected higher probabilities than the observed for one and two seasons, and lower probabilities for seven and eight seasons. The categorisation of established clubs must be assumed otherwise the projected probability of survival will be greatly overestimated. for example if you assume there are no established clubs, the probability of relegation after eight seasons is 600% greater when compared to the inclusion of eleven established clubs in the EFPL. Any club in a league that uses the European promotions-relegation model can use this statistical model to calculate the probability of relegation and generate a more sensitive assessment of risk.
P18.03
Developing elite footballers in China: the role of family, education & coaching on the development of youth talent

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Using a constructivist interpretivist perspective, this research intends to explore youth football development in China, with a particular focus upon the developmental socialization of young players. With the support of Chinese football association and several top level teams, it aims to explore the developmental process of elite players in order to inform future strategy and practice. The research will explore the developmental journey of 20 first team players, using semi-structured interviews to gather data. The interview themes will be grounded within the literature on participant development and will focus on the socio-cultural issues around their family, school education and coaching practice received.

Since the research is ongoing, initial data only can be reported at this stage. However, early analysis suggests that most players who achieved professional level had the full support of their family. However, they had to make a choice between football and studying at the age of around 12 (suggesting an early specialization approach). From these interviews, it appears that despite wishing to focus on football, they perceived the quality of training from coaches to be poor. In addition, education was still emphasized as a priority.

The initial interviews highlight the particular roles & negotiation required with family, education and coaching from a Chinese socio-cultural context. It suggests that whilst there is a distinct relationship between athlete, parent and football coach, the cultural need for education is still prevalent.

P18.04
Football as a peace ambassador - towards a United Football Federation in Cyprus

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The purpose of this research is to investigate the effects of football as an ambassador of peace in solving the persisting conflict on the Island of Cyprus. There are numerous examples where sports has broken down barriers, contributed in solving issues involving ethnical and political structures within communities from many different countries. The war split the island of Cyprus into two sides. Those sides, albeit their differences in social structure, ethnical background and political views, are still striving to get better in football by uniting their powers. In this research, it is hypothesized that this synergy which was emerged from those efforts will be supportive to make peace on the Island of Cyprus. In this research, to assess the effectiveness of unification process between two sides which FIFA and UEFA presidents were also involved, semi-structured interview technique was used for the presidents of Football Federations. Politicians, people from public, football players, coaches, referees, fans and academicians were interviewed with structured
interview technique. Focus group interview technique was used with journalists. Interview records evaluation indicates that majority of the participants of Turkish Republic of Northern Cyprus (TRNC) was supportive of the idea of unity between federations whereas participants of Republic of Cyprus was found to be positive yet cautious about the issue.

P18.05
Big data in the EPL: a peripheralization of football’s core?
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In an insightful article on labor migration patterns in professional football, Jonathan Magee and John Sugden [1] place the United States squarely at the edge of the sport’s global landscape That the country should occupy this position might come as little surprise – indeed, many of its top players have flowed toward the European “core” since the establishment of the English Premier League in 1992 and the Bosman ruling of 1995 The reasons for Europe’s allure are obvious, given the tradition, legitimacy, and financial backing on offer And yet today, the United States has perhaps assumed a more central role in football than at any other point in the game’s history Though Europe has remained an ideal destination for players, recent decades have witnessed the adoption of American-inspired marketing audacity and media packaging The growing prominence of performance metrics may offer further indication of American influence Several top-level English clubs have moved away from a traditional numbers aversion and now incorporate statistics for purposes of tactics, scouting, and player valuation This paper maps out the key individuals and networks that have driven football’s big data spread In so doing, it pays particular attention to the importance of – and interplay among – technological advances, cross-border linkages, hyper-commodification, and rationalization.

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The World Congress on Science and Football 2015 focuses on five codes of football: Soccer, Rugby, and Australian, American and Gaelic Football.

The congress brings together international scientists and practitioners to exchange knowledge and participate in a dialogue on both mono- and multidisciplinary aspects of football. The congress gathers scientists from the natural, human and social sciences and highlights the newest research results, methodologies and applied approaches.

The scientific program includes plenary sessions, invited symposia, free oral presentations, workshops and poster exhibition and presentations within themes like Testing and training, Match analysis, Team cohesion and teambuilding, Globalisation of modern football, Football for health – prevention, treatment and rehabilitation, Women’s football, Fan culture, Environmental factors as well as Football medicine.

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