



International Society of Performance
Analysis of Sport

Programme & Book of Abstracts

Performance Analysis WORKSHOP
April 2nd - 5th, 2013 - Alicante, Spain



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2nd April 2013 (Tuesday)

- 16.00 – 17.00 Accreditation**
- 17.00 – 17.30 Opening Ceremony**
- 17.30 – 18.30 Keynote Speaker Jose Antonio Pérez Turpín**
- 18.30 – 19.30 Keynote Speaker Henriette Dancs**

3rd April 2013 (Wednesday)

- 09.00 – 09.45 Keynote Speaker Stafford Murray**
- 09.45 – 11.00 Presentations of participants**
- 11.00 – 11.30 Coffee Break**
- 11.30 – 13.15 Presentations of participants**
- 13.15 – 14.00 Sport Health**
- 17.00 – 20.00 Educational and training environments**

4th April 2013 (Thursday)

- 09.00 – 09.45 Keynote Speaker Nick James & Michael D. Hughes**
- 09.45 – 11.00 Presentations of participants**
- 11.00 – 11.30 Coffee Break**
- 11.30 – 12.00 Francisco J. Bermell Elecromedicine**
- 12.00 – 14.00 Poster & E- Poster presentations**
- 17.00 – 20.00 Educational and training environments**

5th April 2013 (Friday)

- 09.00 – 09.45 Keynote Speaker Michael T. Hughes**
- 09.45 – 11.00 Presentations of participants**
- 11.00 – 11.30 Coffee Break**
- 11.30 – 12.15 Presentations of participants**
- 12.15 – 13.00 Journal of Human Sport and Exercise presentation**
- 13:00 – 13:30 Closing ceremony**
- 17.00 – 20.00 Educational and training environments**

THEMES OF THE WORKSHOP

1. TEAM SPORTS

- a) SOCCER
- b) HANDBALL
- c) RUGBY
- d) VOLLEYBALL
- e) BEACH VOLLEY
- f) WATERPOLO
- g) BASKETBALL
- h) CRICKET

2. INDIVIDUAL SPORTS

- a) MARCIAL ARTS
- b) TRIATHLON
- c) LONG JUMP
- d) GOLF
- e) SKATING

3. OTHER SPORTS

- a) RACKET
- b) ROWING
- c) RHYTHMIC GYMNASTICS
- d) SAILING
- e) ATHLETICS
- f) VALENCIAL BALL
- g) SWIMMING

4. PYSICAL ACTIVITY AND HEALTH

PROGRAMME

TUESDAY 2nd April

Chair:	Sheila Saiz Colomina
16.00 – 17.00	Accreditation
17.00 – 17.30	Opening Ceremony
17.30 – 18.30	Keynote speaker ANALYSIS TO COACHING IN BEACH VOLLEYBALL Jose Antonio Pérez Turpin University of Alicante, Spain
18.30 – 19.30	Keynote speaker SPORTPROFNET, VARIOO AND THE FUTURE OF PA Henriette Dancs University of West Hungary, Szombathely, Hungary

WEDNESDAY 3rd April

Chair:	Dr. Roberto Cejuela Anta
09.00 – 09.45	Keynote speaker TEAM GB, PA AND THE OLYMPICS 2012 Stafford Murray Director of PA and Biomechanics at the English Institute of Sport

1a.-TEAM SPORTS: SOCCER

09.45 – 10.00	Visual exploratory activity in youth soccer players Eldridge, D; Pulling, C & Robins M University of Chichester, England.
10.00 – 10.15	Calculating home advantage in the first decade of the 21th century UEFA Champions League Saavedra, M ¹ ; Gutiérrez, O ² ; Moure, M ¹ ; Sa, P ³ & Fernández, JJ ¹ ¹ University of A Coruña, Spain ² University of Elche, Spain ³ Instituto Superior da Maia, Portugal
10.15 – 10.30	Effects of playing level, passing skill and fatigue on creating penetration prior to goal scoring in elite soccer Tenga, A & Sigmundstad, E Norwegian School of Sport Sciences, Oslo, Norway
10:30 – 11:00	ANNOUNCEMENTS OF THE WORKSHOP
11.00 – 11.30	COFFEE BREAK

11.30 – 11.45 The effect of pitch size on technical demands in small sided possession games in amateur footballers

Beeching, K; Williams, S & Francis, J
University of Worcester, Worcester, UK

3a.-OTHER SPORTS: RACKET SPORTS

11.45 – 12.00 The relationships between the incidence of winners/errors and the time spent in different areas of the court in elite tennis

Martínez, R¹; Guzmán, JF¹; James, N²; Ramón, J¹; Crespo, M³ & Vuckovic, G⁴

¹University of Valencia, Spain

²Sport Institute, University of Middlesex, London, England

³International Tennis Federation, London, England

⁴University of Ljubljana, Ljubljana, Slovenia

12.00 – 12.15 Discriminatory power of grand slam tennis game-related statistics over the match result

Saavedra, M¹; Gutiérrez, O²; Fernández, D¹; Eiras, G¹ & Fernández, J¹

¹University of A Coruña, Spain

²University of Elche, Spain

12.15 – 12.30 Differences in game statistics between winning and losing tennis players in different surfaces

Fernández, AI; Torres-Luque, G, Sánchez, A & Palao, JM
University of Jaen, Spain

12.30 – 12.45 Differences in game statistics between winning and losing wheelchair tennis players in london paralympics games

Sanchez, A; Palao, JM; Fernández, AI & Torres-Luque, G
University of Jaen, Spain

12.45 – 13.00 Comparison of distance covered in pádel in the serve team according performance level

Ramón, J¹, Guzmán, JF¹, Llana, S¹; Vuckovic, G² & James, N³

¹University of Valencia, Spain

²University of Ljubljana, Slovenia

³University of Middlesex, London, UK

1b.- TEAM SPORTS: HANDBALL

13:00 – 13:15 Relationship between score and verbal behaviour of handball coaches

Calpe-Gómez, V; Guzmán, JF & Grijalbo, C
University of Valencia, Spain

13.15 – 14.00 SPORT HEALTH

17.00 – 20.00 Educational and training environments - *University*

THURSDAY 4th April**Chair:** Federico Carreres Ponsoda**9.00 – 09.45****Keynote speaker****PA OF SOCCER**

Nick James & Michael D. Hughes

London Sport Institute, Middlesex University, London, UK

1d.-TEAM SPORTS: VOLLEYBALL**09.45 – 10.00****Relationship between performance in game actions and match result. A study in volleyball training stages**Claver, F; Jiménez, R; Del Villar, F; Fernández, C & Moreno, MP
University of Extremadura, Spain**10.00 – 10.15****Importance of contextual variables in the study of the use and effect of time-outs in volleyball**Fernández, C; Gil, A; García, L; Carrasco, F & Claver, F
University of Extremadura, Spain**10.15 – 10.30****The ways points are obtained in different age groups and categories of men's volleyball**García de Alcaraz, A; Palao, JM & Ortega, E
University of Murcia, Spain**2d.-INDIVIDUAL SPORTS: GOLF****10.30 – 10.45****How does status affect behaviour? A natural experiment with golf players**Carroll, N
University of Alicante, Spain**2b.-INDIVIDUAL SPORT: TRIATHLON****10.45 – 11.00****Relationship between Training load and the levels of urea and creatine kinase blood in elite triathletes training at altitude**Cejuela, R
University of Alicante, Spain**11.00 – 11.30****COFFEE BREAK****11.30 – 12.00****FRANCISCO J. BERMELL ELECTROMEDICINE****12.00 – 14.00****POSTER & E-POSTER presentations****17.00 – 20.00****Educational and training environments - *Games and Sports Physical Activities at the beach***

FRIDAY 5th April

Chair: Luis Fermín Sanchez García

9.00 – 09.45

Keynote speaker

PROFILING IN TEAM SPORTS

Michael T. Hughes

Lead PA's in English Rugby, Welsh Rugby and British Lions

1c.-TEAM SPORT: RUGBY

09.45 – 10.00

A comparison of selected action variables between top four and bottom four professional rugby league teams when winning and losing matches

Parmar, N; James, N; Greenhalgh, A & Hughes, MD

London Sport Institute, Middlesex University, London, UK

10.00 – 10.15

Try scoring in the RFU championship

Francis, J; Beeching, K & Jones, G

University of Worcester, Worcester, UK

1h.- TEAM SPORT: CRICKET

10.15 – 10.30

Analysis of team performance during the 2011 english county cricket clydesdale bank 40 competition

Garrett, C; Beeching, KL & Francis, J

University of Worcester, Worcester, UK

1b.- TEAM SPORT: HANDBALL

10.30 – 10.45

Is the date of birth an advantage/ally to excel in handball?

Sanchez, C¹; Grande, I²; Sampedro, J² & Rivilla, J²

¹University of Leon

²University of Madrid

10.45 – 11.00

Action sequence analysis in complex sport games

Schrapf, N

Karl-Franzens-University Graz, Austria

11.00 – 11.30

COFFEE BREAK

11.30 – 11.45

Time-motion analysis in women's team handball: importance of maximum oxygen uptake

Manchado, MC¹; Pers, J²; Navarro, F³; Han, A⁴; Sung, E⁴ & Platen, P⁴

¹University of Alicante, Spain

²University of Ljubljana, Slovenia

³University of Toledo, Spain

⁴Ruhr University Bochum, Germany

11.45 – 12.00

Historical, tactical and structural development in defensive system 4:2 in handball

Espina, JJ

University of Alicante, Spain

12.00 – 12.15

Comparative analysis of visual fixation of elite and amateur handball goalkeepers

Rivilla, J; Muñoz, A; Grande, I & Sampedro, J

University of Madrid, Spain

12.15 – 13.00	Journal of Human Sport and Exercise presentation
13.00 – 13.30	Closing ceremony
<hr/>	
17.00 – 20.00	Educational and training environments - <i>Hércules, Lucentum & RCRA</i>

POSTERS & E-POSTERS

1. TEAM SPORTS

A) SOCCER

Analysis of movement patterns among football referees in the 2012 Malaysian Cup

Adnan, R; Muzayin, N& Sulaiman, N
University Technology Mara (UiTM), Malaysia

Association between passing sequences and offensive performance in Spanish soccer national team in World Cup 2010

González, J; Aranda, R; López, I& Calabuig, F
University of Valencia, Spain

Startup type of possession and offensive performance in Spanish soccer national team in Sudafrica World Cup 2010

González, J; Aranda, R; López, I & Calabuig, F
University of Valencia, Spain

Playing tactics on goal scoring in Real Madrid CF in the BBVA League 2011-2012

López, I; Aranda, R; González, J & Calabuig, F
University of Valencia, Spain

Differences of offensive tactics on achieving scoring opportunities by Real Madrid CF & FC Barcelona in the BBVA League 2011-2012

López, I; Aranda, R; González, J & Calabuig, F
University of Valencia, Spain

Video analysis as an instrument in juvenile soccer training

Tursi, D; Napolitano, S; Polidoro, L& Raiola, G
University of Salerno, Italy

Efficiency and biomechanical analysis of kicking ball in soccer eight

Jove, MA; Rodríguez, FN&Moll, SP
University of Alicante, Spain

D) VOLLEYBALL

Movement behaviour of young volleyball players during the blocking

Sáez, NM; Abellan, J; Vila, S & Contreras, OR
University of Castilla La Mancha, Spain

E) BEACH VOLLEY

Type of attack used for under-19, under-21 and elite male beach volleyball players according to player role

Araripe, AI¹; Marcelino, R¹; Mesquita, I¹ & Palao, JM²

¹University of Porto, Portugal

²University of Murcia, Spain

Type of serve used for under-19, under-21 and elite male beach volleyball players according to player role

Araripe, AI¹; Marcelino, R¹; Mesquita, I¹ & Palao, JM²

¹University of Porto, Portugal

²University of Murcia, Spain

Effect reception on attack in female beach volleyball teams

López, AB¹; Palao, JM² & Ortega, E²

¹ San Antonio Catholic University of Murcia, Spain

²University of Murcia, Spain

F) WATERPOLO

Water polo women's pattern tactical experience of an Italian team

Napolitano, S; Tursi, D & Raiola, G

University of Salerno, Italy

G) BASKETBALL

Loglinear analysis of basketball shooting performance

Csátsaljay, G¹; Hughes, MD²; James, N² & Dancs, H¹

¹ University of West Hungary, Hungary

² London Sport Institute, Middlesex University, London, UK

2. INDIVIDUAL SPORTS

A) MARCIAL ARTS

The use of hyperoxia as a way to accelerate the recovery after the karate and judo match

Pupiš, M; Sližik, M & Bartík, P

University Banská Bystrica, Slovakia

Reliability & linearity of an electronic body protector employed in taekwondo games: a preliminary study

Tasika, N & Theodorou, A

University of Athens, TEFAA, Greece

B) TRIATHLON

Chronological vs morphological age in young triathletes and swimmers

Tonda, M; Picón M; Estes, V; Cerdá, M; Castillo, P & Cejuela, R

University of Alicante

C) LONG JUMP

Biomechanical analysis of the final strides of the approach and the take-off by visually impaired class f12 and f13 long jumpers

Panoutsakopoulos, V¹; Theodorou, A²; Kotzamanidou, MC³; Skordilis, E² & Kollias, IA¹

¹University of Thessaloniki - TEFAA, Greece

²University of Athens - TEFAA, Greece

³AKMI Metropolitan College Thessaloniki, Greece

Colour contrast and regulation of the long jump approach run

Theodorou, A¹; Loakimidou, E¹; Kouris, P¹; Panoutsakopoulos, V² & Smpokos, E³

¹University of Athens - TEFAA, Greece

²University of Thessalonika - TEFAA, Greece

³Hellenic Army Academy

E) SKATING

Body composition and somatotype of elite skaters

Manchado, MC¹; Ferragut, C²; Abalades, JA³ & Vila, H⁴

¹University of Alicante, Spain

²University of Alcalá de Henares, Madrid, Spain

³University of Murcia, Spain

⁴University of Vigo, Pontevedra, Spain

3. OTHER SPORTS

A) RACKET

Performance analysis through the use of temporal activity patterns of elite players in beach tennis

Pérez, JA; Grau, D & Santos, D

University of Alicante, Spain

B) ROWING

Comparison of performance in a resistance test in rowing-table exercise with and without control of speed execution using a metronome in female Fixed Bench Mediterranean rowers

Javaloyes, A; Clement, C; Bueno, G; Martínez, AD; Miguel, O & Cejuela, R

University of Alicante, Spain

Comparative analysis of the Olympic Rowing and Mediterranean Rowing Fixed Seat: a sociological study

Penichet, A & Jiménez, JM

University of Alicante, Spain

Emotional intelligence and Mediterranean Rowing Fixed Seat

Pérez, MM; Penichet, A; Motera, A & Rodríguez, A

University of Alicante

Relationship between jump height and results in school rowers (14-17 years old)

Castillo, M; Jover, R & Penichet, A

University of Alicante, Spain

C) RHYTHMIC GYMNASTICS

Flexibility, strength and technical aspects of the split jump in rhythmic gymnastics

Verheul, M¹; Timmons, W¹ & Mendez, B²

¹University of Edinburgh, UK

²University of Vigo, Spain

Determinants of competitive performance in rhythmic gymnastics. A review

Bobo, M¹ & Mendez, B²

¹University of ACoruña, Spain

²University of Vigo, Spain

Apparatus handling in elite individual rhythmic gymnastics

Bobo, M¹; Sierra, E¹ & Fernández, MA²

¹University of ACoruña, Spain

²University of Vigo, Spain

D) SAILING

The profile of elite national dinghy: Spanish Optimist Cup 2012. An educational approach

Silvestre, MM & Saiz, S

University of Alicante, Spain

E) ATHLETICS

Effects of randomization versus preorientation of subjects for the prediction of maximum oxygen uptake using the twelve minutes run test (12-mrt)

Assomo, PB¹; Honoré, S¹; Richard, W² & Etoundi, LS³

¹University of Douala, Cameroon

²National Institute for Youth and Sports, Yaounde, Cameroon

³Higher Teacher Training College, Yaounde, Cameroon

F) VALENCIAN BALL

Height, weight, body mass index, age and professional years in Valencian Ball players in relation to position

Martínez, JA & Pascual, N

University of Alicante, Spain

G) SWIMMING

Review of methods to the determination of the VO2 MAX and the anaerobic threshold in swimming

De Frutos, Luis; Muñoz, F & Cejuela, R

University of Alicante

Comparison of the economy of swimming with wetsuit or no wetsuit

Molina, NJ; Cejuela, R; Romero, I; Pascual, D; Ortola, JM & Javaloyes, A

University of Alicante

4. PHYSICAL ACTIVITY AND HEALTH

The benefits of a physical activity intervention for people with mild cognitive impairment

Tortosa, J; Caus, N & Martínez, C
University of Alicante, Spain

The influence of standard or dynamic warm-up in power exercise leg-press

Davó, N; Llorca, JM; Marín, M; Ruiz, A & Cejuela, R
University of Alicante, Spain

The examination of physical education performance with relation to the social background and nutrition

Borkovits, M & Szabó, A
University of Szeged, Hungary

Sports, health and flow

Szabó, A & Borkovits, M
University of Szeged, Hungary

ABSTRACTS

KEYNOTE SPEAKERS

Ks. 1

Analysis to Coaching in Beach Volleyball

Jose Antonio Pérez Turpín

University of Alicante, Spain

Can we identify all factors affecting the performance in beach volleyball, just by using digital technologies? Yes, we can. To develop this analysis a specific tool has been used in order to collect data with video recordings. To research variables at match time, passed types and results; even serve zones and types of serve during the match. Using digital technologies (Lieberman, Katz & Hughes, 2002) we can analyse different kind of data and carry out the research at the same time the competition is taking place. The research objectives are:

1. Analysis of the time factor.
2. Analysis of the pass technique in competitive men's and women's international elite beach volleyball.
3. Analysis of the different zones for serve.
4. Analysis of the kind of serve used during match, related to the phases of each set.

Therefore, images have been digitalized, we have also created a matrix of codes applied with technical and tactical aspects of beach volleyball, we have even captured all images for each of the matrix code and combined the matrix codes to identify beach volleyball performance factors.

The next step is data analysis – design and techniques as the Information Processing and Statistical Procedure:

- Categorization of the variables.
- Data downloaded to Excel by the analysis program.
- Data processed with SPSS.
- Statistically significant $p < 0.05$ and highly significant $p > 0.01$.

The results of this analysis provide relevant information to identify various aspects that should be considered, both in analysis and interpretation of the game action, in the identification and organization of the contents for teaching and training this sport.

Ks. 2**Sportprofnet, Varioo and the Future of PA**

Henriette Dancs

University of West Hungary, Szombathely, Hungary

Varioo SPN Knowledge Bank will be set up by academics, researchers, students by creating online collections (up to 15 results) of free website reference addresses. It is available from: www.sportprofnet.com and also from www.varioo.com. Registration to use Varioo is necessary. Registration can be done even with the same email/user name and password as in SPN, or with FB email and password. Registration is free. The editors of Varioo SPN Knowledge Bank are themselves the creators of the website - the self-development of it should be similar to Wikipedia.

This presentation will explore the functions and properties of Varioo Knowledge Bank.

- Search for information, but save those important websites.
- Create a complex, multiple collection and use it as an online directory.
- Use your collected links repeatedly as online bookmarks.
- Use and re-arrange collections of others.
- Use one of your personalized collection as your online starting page.
- Add your selected online literature collections to quick share with target audiences – students, research colleagues or friends?
- Collect the website addresses of your colleagues, friends, etc., for quick access to multiple sites of information.

The overall structure of VARIOO will be explained and the relative position of SPN defined. The benefits to students, staff and universities will be explored and the potential of this knowledge base, to voluntary organisations such as ISPAS and the INSHS Network, will be opened up to the delegates.

Ks. 3

Team GB, PA and the Olympics 2012

Stafford Murray

Director of PA and Biomechanics at the English Institute of Sport, UK

London 2012 saw team GB deliver their largest medal haul in modern times at an Olympic Games, propelling them to a record breaking 3rd position in the overall medal table. One of the vital components to this success has been the significant increase in sports science support to sports, delivered predominantly by the English Institute of Sport (EIS), over the past 10 years. One of largest disciplines within the EIS is performance analysis, boasting some 30+ staff members delivering objective performance feedback to 27 Olympic, Commonwealth and Professional Sports.

This session will outline:

1. What the EIS is and what it aims to achieve.
2. The growth and development of Performance Analysis within the EIS.
3. Performance Analysis support and interventions during London 2012 Olympic Games.
4. Where the EIS sees the future of Performance Analysis.

Ks. 4**Performance Profiling in Soccer**

Mike Hughes & Nic James

London Sport Institute, University of Middlesex, London, UK

Performance Profiling in soccer has preoccupied analysts for decades, for example from Reep and Benjamin (1969), through Reilly and Thomas (1976), Partridge and Franks (1989), Hughes, Dawkins, David and Mills (1997) up to Rees, G., James, N. and Vučković, G. (2011). A number of the early research papers suffered because of the lack of understanding the importance of reliability of objective observation and the properties of performance indicators that more recent research has highlighted. The use of action variables will be presented and how we determine which are important through multivariate analyses of events? How do we know when we have enough data for a stable profile and what can we do with only one or two matches to analyse? The profiles defined by these performance indicators can be enhanced and complemented by the use of qualitative data, analyses of perturbations in the match and using ‘momentum’ analyses of positive and negative skill executions during the match.

These methodologies will be explored and examples used to demonstrate where performance analysis of soccer will be taking us over the next decade.

References

- Hughes, M., Dawkins, N., David, R., & Mills, J. (1998) The perturbation effect and goal opportunities in soccer. *Journal of Sports Sciences*, 16, 20.
- Partridge, D. & Franks, I.M. (1989) A detailed analysis of crossing opportunities from the 1986 World Cup. (Part I) *Soccer Journal*. May-June, pp. 47-50.
- Reep, C. and Benjamin, B. (1968) Skill and chance in association football. *Journal of the Royal Statistical Society, Series A*, 131, 581-585.
- Rees, G., James, N. and Vučković, G. (2011). Individual possessions as a Performance indicator in English Championship Football. Research paper presented at the 6th INSHS International Christmas Sport Scientific Conference “Qualitative and Quantitative Research in Sport Science”, Szombathely, Hungary, December.
- Reilly, T. & Thomas, V. (1976) A motion analysis of work-rate in different positional roles in professional football match-play. *Journal of Human Movement Studies*, 2, 87- 97.

Ks. 5**Applied Performance Analysis in Elite Rugby Union**

Michael T Hughes

PGIR, Bath, UK

Team performance in rugby has typically been assessed through the comparison of winning and losing teams, however, the distinction between winning and losing was used as the sole independent variable. Although well established in other sports, insufficient data currently exist regarding the development and measurement of performance indicators in rugby union. Consequently, there is a need to develop a rigorous methodology for practitioners to adopt when conducting the analysis of performance behaviours in Rugby Union. The publication of the book *Moneyball* has heightened the awareness of accurate performance description using Key Performance Indicators (KPI's). Reliable identification of these KPI's will subsequently allow the formation of Performance Profiles that describe patterns of play and possibly offer some prediction of future performance.

It is the aim of this presentation to describe current endeavours to measure and feedback some of these KPI's and profiles in an applied setting so that they are meaningful and actionable for coaches and players. Potential areas of future research, such as socio-metric analysis, could well help to better understand the dynamic relationships that exist between players in a sport that has complex inter-personal relationships.

References

- HUNTER, P. & O'DONOGHUE, P.(2001). A match analysis of the 1999 rugby union world cup. In *Pass.com: Fifth World Congress of Performance Analysis of Sport* (edited by M.D. HUGHES AND I. FRANKS), pp. 85-90. Cardiff: UWIC.
- WILLIAMS, J.J. (2012 – In Press). Operational definitions in performance Analysis and the need for consensus. *International Journal of Performance Analysis in Sport*.
- LEWIS, M. (2003). *Moneyball: The Art of Winning an Unfair Game*. USA: W. W. Norton & Co.

ORAL PRESENTATION

SOCCER

Op. 1.1

Visual exploratory activity in youth soccer players

David Eldridge¹, Craig Pulling¹ and Matthew Robins²

¹*Dept. of Adventure Education and Physical Education, University of Chichester, England.*

²*Chichester Centre of Applied Sport and Exercise Sciences, University of Chichester, England.*

Introduction: Visual exploratory activity is defined as movements of the body and/or head prior to receiving the ball, engaged in to perceive information away from the ball (Jordet, 2005). Williams et al., (2003) stated that little attention has been paid to the effect of visual exploratory activity on player actions. The purpose of this study was to examine the effects of visual exploratory activity, prior to receiving the ball in the middle third of the pitch, on the actions of midfield players.

Materials and Methods: Three youth central midfield players' actions were recorded to identify their visual exploratory activity. This behavior was then compared to their actions after receiving the ball. A computer based analysis system was used to analyse their actions post-event. Players participated in five training games, each 20 minutes in duration. The player's actions were split into five themes to analyse their association with visual exploratory activity: (1) Maintaining possession, (2) Loss of possession, (3) Field location of maintained possessions (4) Defensive pressure, and, (5) Turning.

Results: The key findings of the study reveal that the players performed more forward passes, more attacking-half passes and performed more turns when opportunities arose; as well as experiencing less defensive pressure ($p < 0.01$) when the players had performed visual exploratory activity prior to receiving the ball compared to when they did not conduct visual exploratory activity.

Conclusions: It would be suggested that coaches should encourage players to perform visual exploratory activity prior to receiving possession of the ball. Coaches should be aware that visual exploratory activity can influence the technical and tactical aspects of performance and could aid player development.

References:

- Jordet G. Perceptual training in soccer: An imagery intervention study with elite players. *Journal of Applied Sport Psychology*. 2005; 17: 140-156.
- Williams A, Williams M, Horn R. Physical and technical demands of different playing positions. *Insight*. 2003; 6(2): 24-28.

Op. 1.2**Calculating home advantage in the first decade of the 21th century UEFA champions league**

Miguel Saavedra¹, Óscar Gutiérrez², Manuel Moure¹, Paulo Sa³ & Juan J. Fernández¹

1 University of A Coruña (Spain)

2 University of Elche (Spain)

3 Instituto Superior da Maia (Portugal)

In this article we analyze the home advantage (HA) in the UEFA Champions League from 2000/2001 season until 2010/2011. The sample included teams from 29 European countries during 11 seasons and allows us to study 11 competitions and 1,200 games corresponding with the league phases and 130 games from the qualifying phases. The HA exists and is significant in five of the eleven seasons analyzed with a value of 57.64 ± 1.41 in the league phases of the competition. In the qualification rounds the HA has a value of 61.77. The evolution of the HA presents a slight decreasing tendency covered by strong oscillations in both league and knock out phases. A direct association was found between the HA and the classification of a team in both league and qualifying phases. The association between the HA and the UEFA ranking was only found in the league phases. The countries with the best values of HA were the ones that have the most powerful league teams in the European continent. Finally, in the phases of the league the teams that win the most in the tournament obtain less values of HA, although in eliminatory rounds these teams have higher values.

Op. 1.3**Effects of playing level, passing skill and fatigue on creating penetration prior to goal scoring in elite soccer**

Albin Tenga & Einar Sigmundstad

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

Penetration, i.e. moving the ball towards the opponent's goal past opponent player(s) while maintaining control over the ball, is necessary prior to goal scoring in soccer. Apart from the influence of luck, factors such as quality of individual players, playing tactics and physical fitness are thought to have effect on creating penetration prior to goal scoring. The purpose of this study is to assess the relative effects of playing level, passing skill and fatigue on creating penetration prior to goal scoring in elite soccer. The sample included 634 team possessions leading to goals scored without tight defensive pressure (qualified penetrations) and 344 team possessions leading to goals scored under tight defensive pressure (forced penetrations) in season 2011 of Norwegian top professional league (706 goals) and season 2011-12 of the UEFA Champions league (340 goals). The results for the variable "league" showed for example that the proportion of qualified penetrations prior to goal scoring in high level of play (Champions league, 75%) was higher than in low level of play (Norwegian league, 60%), while the proportion of forced penetrations in Norwegian league (40%) was higher than in Champions league (25%). Multiple logistic regression analyses showed that Champions league was more effective in creating qualified penetrations than Norwegian league (OR=1.76, 95% confidence interval: 1.27 to 2.44, P=0.001). It was concluded that all three factors had an effect on creating qualified penetrations prior to goal scoring; with passing skill (P<0.001) and playing level (P=0.001) appearing to be the stronger factors than fatigue (P=0.011). We recommend that soccer practitioners especially from low levels of play work with players to improve the skills needed to manage longer passing sequences.

Op. 1.4**The effect of pitch size on technical demands in small sided possession games in amateur footballers**

Kelvin Beeching, Stuart Williams & John Francis

University of Worcester

Introduction

Small sided games (SSGs) have had a great significance in football training by providing physiological and technical development for all levels of participation (Rampinini et al. 2007). Various researchers have studied the effect of SSGs on technical demands (see Panter et al., 2008, Katis and Kellis, 2009) with both Platt et al. (2001) and Katis and Kellis (2009) agreeing that manipulation of player numbers and pitch size has an impact upon the technical actions recorded within SSGs. Whilst there is an abundance of research in SSGs, research in small sided possession games (SSPGs) is lacking. SSPGs can be defined as the use of fewer participants, smaller pitch dimensions and no football goals where the aim is purely to retain possession. The aim of this study was to examine the effect of pitch size on technical demands during SSPGs in amateur footballers.

Method

Players (n=8) participated in 3v3 and 4v4 small sided possession games over three different pitch dimensions (small; 20x25m, medium; 25x30m, large, 30x40m). Each SSPG was performed as three bouts of 4 minutes and one final bout of 2 minutes, separated by 2 minutes of rest. Each game lasted 20 minutes. Games were filmed and analysed post match with the following variables recorded; 1 touch possessions, 2 touch possessions, 3+ touch possessions, dribbles, pass, receive, interception, tackle, header and total number of actions.

Results

ANOVA mixed factorial test identified interception ($P>0.05$) and tackles ($P>0.05$) as a statistical significant difference for technical demands when the number of participants and pitch dimensions changes. Passes were the most frequent recorded event across all pitch sizes for both 3v3 and 4v4 SSPGs. Medium pitch size was found to provide the highest mean number of actions per player for both 3v3 and 4v4.

Conclusion

Small sided possession games can be used to develop football player's technical ability. Coaches should carefully consider the objective of the training session prior to manipulating pitch size and participant numbers in order to ensure the objective of the session remains central to the game.

RACKET

Op. 2.1

The relationships between the incidence of winners/errors and the time spent in different areas of the court in elite tennis

Rafael Martínez Gallego¹, José F. Guzmán¹, Nic James², Jesús Ramón-Llin¹, Miguel Crespo³ and Goran Vuckovic⁴

1 Faculty of Physical Activity and Sport Sciences, University of Valencia, Spain

2 Sport Institute, University of Middlesex, London, England

3 International Tennis Federation, London, England

4 Faculty of Sport, University of Ljubljana, Ljubljana, Slovenia

INTRODUCTION: Notational analysis allows dynamic and complex situations to be measured objectively, in a consistent and reliable manner, so that critical events can be quantified during tennis competition. Through statistical analyses of this data can be defined the impact of particular strokes and other performance indicators on a particular tennis match outcome. Winners and errors have been two of the most studied performance indicators to predict tennis match outcome and the playing style of the players. Furthermore, the position occupied by the player on court has also been shown to be a good indicator of both the final result and the style of play. The aim of this study was to examine whether there were differences between game winners and losers in terms of number of winners and errors, and observe if there were differences in them according to the player's position.

MATERIAL AND METHODS: Matches (N = 8) at the 2011 ATP tournament 500 Valencia were recorded and analysed using SAGIT, a computer vision tracking system that allowed both

players' movements to be tracked automatically, albeit with operator supervision. The software was programmed to divide each half of the court into offensive and defensive zones. The data was split into (N = 188) games for analysis purposes and the outcomes of the rallies were classified as winners, forced and unforced errors.

RESULTS: The proportionate frequency of unforced errors for losers was higher (median=10%) than winners (median=0%; $z=6.72$, $p<0.001$), and the proportionate frequency of winners and forced errors of the opponent was higher for winners (median=14%) than for losers (median=0%; $z=6.45$, $p<0.001$). The time spent of winners in the offensive zone correlated with the percentage of winners and forced errors from the opponent moderately ($r = 0.33$), while for the losers time spent in the offensive zone correlated with the percentage of unforced errors, although weaker ($r = .15$).

CONCLUSIONS: These results suggest that when game winners are in offensive zone they are in a better position, which allows them to strike the ball more effectively and consequently, hit more winners or force opponent error. On the contrary when game losers are in offensive zone, they commit more unforced errors, losing their options to win the point or force their opponent into errors. Future investigations should consider shots played in each zone separately, in order to improve the understanding of successful performance.

Op. 2.2

Discriminatory power of grand slam tennis game-related statistics over the match result

Miguel Saavedra García¹, Óscar Gutiérrez Aguilar², David Fernández Lastra¹, Gabriel Eiras Oliveira¹, Juan J. Fernández Romero¹

1 University of A Coruña – A Coruña, Spain

2 University Miguel Hernández – Elche, Spain

The objective of this present study is to determine the variables they may predict the result of a tennis match. A total of 508 Grand Slam matches were analyzed in 2012. The variables recollected, reflect the official statistics of the organizers. Unforced errors, the percentage of points won from return and the total number of points won prove their importance both at a descriptive level and discriminate analysis, while the percentage of first serves, direct serves,

double faults and the percentage of points won on first and second serves are variables that may also determine the winner of the match but in less measure.

Op. 2.3

Differences in game statistics between winning and losing tennis players in different surfaces

Ángel Iván Fernández-García, Gema Torres Luque, Alejandro Sánchez Pay & José Manuel Palao Andrés

University of Jaen, Spain

The aim of the present study was to analyze the differences in tennis game statistics between winning and losing players. The data from 125 matches from Roland Garros and Wimbledon 2012 were analysed, and included matches from second round (round of thirty-two) to the final, inclusive, representing 49,60% of these competition matches. The number of players analyzed was 147, located between 1st and 212th ranking classification of ATP (Association Tennis Professionals). The variables studied were grouped in four groups: variables related to serve, variables related to return, variables related to winners and errors and variables related to net points. A univariate (Mann Whitney U) and multivariate (discriminant) analysis of data was done. In both surfaces, winning players had average values that were significantly higher in total aces, points won on first serve (%), points won on second serve (%), return points won (%), break points obtained, break point won (%) and net points won (%). In clay, winning players also had higher values of winners. Losing Players had significantly higher averages values for the variables double faults and unforced errors. The result showed that: a) winning players are safer and offensive with their serve than loser players; b) in the return games, winning players played better than loser players (win more no-break point and break point); and c) across the board, winning player are safer (make fewer unforced errors) than loser players and are more effective when they approached to the net. The results could be used as a reference for practice and competition in peak performance players and show that the variables with significant differences between winners and losers are very similar on grass and clay.

Op. 2.4**Differences in game statistics between winning and losing wheelchair tennis players in London Paralympics Games**

Alejandro Sánchez Pay, José Manuel Palao Andrés, Ángel Iván Fernández-García & Gema Torres Luque

University of Jaen, Spain

The aim of the present study was to analyze the differences in wheelchair tennis game statistics between winning and losing players. The data from 140 sets of 64 matches from the London Paralympics Games 2012 were analyzed. The variables studied were grouped in four groups (variables related to serve (a), to return (b), to winners and errors (c), and variables related to net point (d)), and studied in relation to the result of the set (win or lose). Data was recollected from website <http://www.london2012.com/paralympics/wheelchair-tennis>. A univariate (Mann Whitney U) and multivariate (discriminant) analysis of data was done. Winning players had significantly higher average number of total aces, first serve (%), aces on first serve, point won on first serve, point won on first serve (%), point won on second serve, point won on second serve (%), receiving points won, receiving points won (%), break point won, break point chance, break point won (%), return of serve winners, total winners, forehand winners, backhand winners, net point won, net point played, net point won (%), and total point won. Losing players had significantly higher averages for the variables double faults, point played on second serve, forced errors and unforced errors. The result showed that: a) winning players do less errors and play more offensive with their serve than loser players; b) in the return games, the winning players played better than loser players (win more no-break point and break point); and c) across the board, winning player make fewer errors (forced an unforced errors) and more offensive (play more point on net and make more winner shot) than loser players. The value presented could be used as a reference for practice and competition in peak performance players.

Op. 2.5**Comparison of distance covered in pádel in the serve team according performance level**

Jesus Ramón-Llin¹, José Francisco Guzmán Luján¹, Salvador Llana¹, Goran Vučković² & Nic James³

1 University of Valencia

2 University of Ljubljana

3 University of Middlesex.

INTRODUCTION: Although pádel is the second most practiced sport in Spain, the scientific knowledge about the players' work-load is still very low. The serve is a critical situation because the team has the opportunity to start the point with an attacking tactics by approaching the net straight after the serve. However, this kind of analysis was never undertaken before. We think that serve movement pattern changes according level performance so we considered to control this variable

OBJECTIVE: This study aimed to compare the physical activity of the server in pádel and his partner in terms of distance covered according performance level. It was hypothesized that the server in higher performance would cover more distance than his partner due to the approach to the net after the serve, while his partner is already in the net.

METHODS: We analysed a sample of 1500 points divided in 3 levels of performance (high, medium and recreational, 500 points each one). We compared distance covered between the server and his partner in 500 hundred points for each level performance. The points were taken from 14 matches (4 of high, 5 of medium and 5 of recreational level). SAGIT software (Vučković et al.2002) was used to get data of players' distance covered. Data analyses were performed with Microsoft Excel and SPSS 20.0.

RESULTS: We used Wilcoxon Signed Ranks test. At high level, the median of distance covered by the server was of 10.7 meters, significantly greater than the 7.5 meters covered by the partner of the server ($Z = -11.7$; $p < .001$). At medium level, the median of distance covered by the server was of 9.2 meters, also significantly greater than the 6.6 meters covered by the partner of the server ($Z = -12.1$; $p < .001$). At recreational level, the median of distance covered by the server was of 8.4 meters, also significantly greater than the 6.1 meters covered by the partner of the server ($Z = -10,2$; $p < .001$).

DISCUSSION: Independently of the level performance, the player serving covered more distance than his partner. Thus, coaches should consider that in hard matches, the player who needed more number of points to complete his serve will probably be more tired than his partner. In other way, coaches should include the approach to the net after the serve in the endurance training. Finally, coaches should decide what player is going to start serving each set, which should be the skillfullest or the thoughtest.

VOLLEYBALL

Op. 3.1

Relationship between performance in game actions and match result. A study in volleyball training stages

Fernando Claver Rabaz, Ruth Jiménez Castuera, Fernando Del Villar Álvarez, Carmen Fernández Echeverría & M. Perla Moreno Arroyo

Faculty of Sport Sciences. University of Extremadura.

Introduction

In recent years, a number of quantitative methods have been identified and developed with the specific intent of assisting the objective analysis of athletic performance (Nelson & Groom, 2012).

The main aim of the research was to clarify the importance of an adequate performance in game actions as determinant of match result in a sample of young volleyball male players.

Methods

The study sample was composed of 74 male participants belonging to the Under-16 teams (M: 14.61; SD: .88) from the Extremadura Volleyball League in 2010/2011 season.

The studied variables were: performance in game actions (serve, defence, setting and spike) and match result. FIVB Observational System (Coleman, 1975) has been the instrument for data recolection, it has been applied previously in numerous studies and is accepted as a valid tool for research community.

Results

T-test for independent samples results showed statistically significant differences in performance of game actions of: serve ($F(1,72)=3.86$; $p=.048$; $\eta^2=.492$), defense ($F(1,72)=14.07$; $p<.001$.; $\eta^2=.959$), setting ($F(1,72)=34.83$; $p<.001$.; $\eta^2=1.00$) and spike ($F(1,72)=9.05$; $p=.004$; $\eta^2=.84$) between players from winner and loser teams.

Discussion

Our results coincide with previous studies that emphasize the importance of game actions in volleyball (Asterios et al., 2009). This analysis is important as it assists in the collection of performance information that can be feedback to athletes in an attempt to enhance their understanding and competitive performance (Maslovat & Franks, 2008) al also for talent identification and recruitment (Carling et al., 2005).

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Op. 3.2

Importance of contextual variables in the study of the use and effect of time-outs in volleyball

Carmen Fernández Echeverría, Alexander Gil Arias, Luis García González, Filipe Carrasco Suarez and Fernando Claver Rabaz

Faculty of Sports Sciences. University of Extremadura

The notational analysis is defined as an “objective way of recording performance so that key elements of that performance can be quantified in a valid and consistent manner” (Hughes, 2005, p.1). These analysis is aimed to improve training and competition for athletes (Hughes & Bartlett, 2002). Recent research in this line suggest the need to consider the environmental conditions, such as the quality of the opposition, status game (Lago, 2009; Marcelino et.al, 2010; Taylor, Mellalieu et. al, 2008), the match period (Marcelino et. al, 2012) and score (Fernández del Valle et. al, 2008), to contextualize players 'or teams' performance.

Therefore, the objective of this study is to present a research proposal of employment and effects of time-out in volleyball, considering contextual variables that may affect them. The study sample will consist of 232 time-outs (TO) ordered in the Spanish Championship of Regional Selections in 2010 (Under-14 and Under-16, male and female categories). The studied variables were: I) The time-out effect a) positive effect b) negative effect or no effect. II) Number of serves (made by the same player) previously to the TO. III) Period of the set in what the TO was ordered. IV) Points of difference between the teams at the moment the TO was ordered. V) Set demands, defined by the set result. VI) Match demands, defined by the match outcome of the game.

Possible results obtained after applying descriptive, correlational and discriminant analysis allow us to know, so contextualized, the TO employment that volleyball coaches make in formative stages and the effects they have on performance. Also, these results, will extend the knowledge about the use of game pauses during the team management, providing coaches a specific guideline for using it to improve the possibilities that TOs offer at different moments in game.

Op. 3.3

The ways points are obtained in different age groups and categories of men's volleyball

Antonio García de Alcaraz, José Manuel Palao & Enrique Ortega

University of Murcia. Department of Physical Activity and Sport.

In volleyball, a team can score a point through the serve, attack, block, and opponent's errors. These technical actions are called “terminal actions”, and the rest of technical actions

(reception, set, and dig) are known as “continuity actions” (Palao, et al., 2004). The winning teams showed a balance in the percentage of points obtained by terminal actions in top level (Marcelino, et al., 2010), but the way points are obtained may vary depending on age-category competition. The aim of this research study was to find out the way points are obtained in different age groups and categories of men’s volleyball.

A stratified random sample of 300 sets (60 sets/category) was used. The sample were recorded from U-14, U-16, and U-19 Spanish National Men’s championships (2008-09), senior first league (2008-09 & 2009-10 season), and 2008 Olympic Games. A correlational intergroup design was used. The variables were: a) competition category; and b) points obtains with serve, block, attack, counter-attack, and opponent errors. Match observation was carried out by an experienced observer, using Data Volley® software. Reliability was .93 with Cohen Kappa test. A descriptive and inferential analysis was done (Kruskal-Wallis, U-Mann Withney, and Bonferroni Procedure ($p<.05$) test) using SPSS 15.0.

The percentages of points scored with the serve and counter-attack decreased significantly from U-14 to the Olympic Games (from 15.6% to 4.1%, and from 23.5% to 17.1%, respectively). Conversely, the percentage of points scored with attack and block increased significantly (from 17.4% to 40.7%, and from 4.5% to 11%, respectively). Opponent error decreased as the category of competition increased (from 39.1% to 27.1%).

The ways teams obtain points are varied in different age groups and categories of men’s volleyball. Teams at formation categories get significantly more points from defensive phase (serve and counter-attack) and opponent errors, and senior teams get significantly more points from side-out phase (attack). These values can help coaches to guide the training of their players to long term competition demands.

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GOLF

Op. 4.1

How does status affect behaviour? A natural experiment with golf players

Nathan Carroll

Universidad de Alicante, Departamento de Fundamentos del Análisis Económico

Peer effects are relevant in many domains, class rooms, work teams and prisons are the most common examples. The purpose of this study is to ascertain whether the performance of female professional golf players in tournaments is affected by characteristics of their playing partners. In particular, does the rank of a player within a group of playing partners affect performance on average and does it affect risk-taking.

A previous paper in the economics literature found no peer effects (Guryan et al (2009)) amongst male professional golf players, however they ignored potential peer effects on risk-taking and their focus was on whether average characteristics of partners affected performance, rather than relative characteristics.

The methodology takes advantage of a feature of LPGA tournaments, the random allocation of players to groups. Using this feature and taking account of the expected within group rank of a player, causal effects are estimated using ordinary least squares regressions. The current dataset includes around 2,000 round observations.

The key results are firstly that rank within a playing group does not significantly affect the average performance of female golf players. However, risk-taking does appear to be affected, the variance of players' scores across the 18 holes of a round, the chosen proxy of risk-taking, is significantly higher when players are the best ranked amongst their playing partners.

There is no economic incentive for player performance or strategy to vary depending on who players are partnered with in a golf tournament. Possible mechanisms behind the observed effect include learning and imitation of partners and competition within the group that provides motivation or negative competitive pressures. Analysis of the results points against the hypotheses of learning and negative competitive pressures, but instead suggest the highest ranked player is used as a focal point for comparison of own performance.

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TRIATHLON

Op. 5.1

Relationship between training load and the levels of urea and creatine kinase blood in elite triathletes training at altitude

Roberto Cejuela Anta

University of Alicante

The objective of this study is to determine the relationship between the training load, measured in objective and subjective load equivalent (ECOs and ECSs) and levels of creatine kinase (CK) and urea in elite triathletes during a period of training at altitude (21 days to 2321m). Seven male elite triathletes assessed using the ECSs scale (Cejuela & Esteve, 2011) the training conducted at two different times, 1) within 20 minutes of completion of the training and 2) up on awakening the next day; The objective load was measured by ECOs (Cejuela & Esteve, 2011). The values of CK and urea were determined on 10 and 16 of the camp, after the day of discharge of training. The subsequent statistical analysis revealed that levels of load, CK and Urea for this group in their usual training were within the reference levels of the scientific literature for athletes. Urea values do not present significant differences between the two analyses. The values of CK present variations typical of the type of training. There is a relationship between objective and subjective load during the weeks of training.

RUGBY

Op. 6.1

A comparison of selected action variables between top four and bottom four professional rugby league teams when winning and losing matches

Nimai Parmar, Prof. Nic James, Dr. Andrew Greenhalgh & Prof. Michael D. Hughes

School of Health and Education, London Sport Institute, Middlesex University, UK

Introduction

Rugby league is an international collision sport played in many countries around the world (Sirotic et al., 2009). Past research in rugby league has focused on anthropometric and physiological qualities of players (Morgan & Callister, 2011) and physical collisions and injury rates (Gabbett et al., 2011). Despite the identification of it being a useful tool for gaining a further understanding of the sport (Gabbett, 2005), there appears to be a paucity of performance analysis research in professional rugby league. Therefore, this study aims to utilize performance analysis to identify the differences in selected action variables, between top and bottom ranked professional rugby league teams. A simple sample of matches would likely be biased toward top teams winning more matches than bottom teams, therefore comparisons were made for winning matches only and then losing matches only.

Methods

Opta Sports data collected from 27 rounds of the 2012 Super League season, amounting to 189 matches, were processed in Microsoft Excel and analysed using a series of Independent Samples T-Tests using the IBM SPSS statistics package (v19, SPSS Inc., 2010). Teams were ranked, and selected for this study, based on their final league standings at the end of the 2012 Super League season as being top four (teams finishing in places 1-4) and bottom four (teams finishing in places 11-14). Actions analysed in attack were the number of carries, metres gained, line breaks and successful and unsuccessful offloads and in defence the number of completed and missed tackles.

Results

Results indicated that in winning games, the top four and bottom four ranked teams made a similar amount of carries (mean=216.5±24.6 and 209.7±21.1 respectively), total tackles

(mean=282.7±35.6 and 275.3±40.1 respectively) and both successful (mean=10.1±4.5 and 8.9±3.0 respectively) and unsuccessful (mean=2.4±2.1 and 2.3±1.1 respectively) offloads. However, top ranked teams were able to make more line breaks (mean=40.1±11.8, $p<0.05$) and gain more metres (mean=1477.0±180.3, $p<0.05$) than bottom four (mean=34.3±9.9 and mean=1374.6±159.1 respectively), whilst making less missed tackles (mean=16.4±6.4, $p<0.001$) in comparison to the bottom four (mean=22.7±6.3). Results for losing games showed that the top four and bottom four ranked teams made a similar amount of successful (mean=8.4±4.2 and 8.3±4.4 respectively) and unsuccessful (mean=2.4±1.5 and 2.4±1.5 respectively) offloads, total tackles (mean=317.6±31.7 and 305.2±36.9 respectively) and metres gained (mean=1223.8±135.5 and 1155.5±178.6 respectively). Although, top four teams performed more carries (mean=199.5±26.0, $p<0.05$) than bottom four teams (mean=187.3±21.5), whilst missing less tackles (mean=23.6±9.1, $p<0.01$) than bottom four teams (mean=28.5±8.5).

Discussion

This pilot analysis of selected action variables in professional rugby league suggests that significant differences are clear between action variables depending on team quality and match outcome. Practical information for coaches of both higher and lower ranked teams is provided by this study. Future analysis will include larger amounts of action variables and potentially include opposition quality as an independent variable.

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Op. 6.2

Try Scoring in the RFU Championship

John Francis, Kelvin Beeching & Gareth Jones

University of Worcester, Worcester, UK

Previous Rugby Union studies have identified a strong correlation between the number of tries scored and winning matches (Laird & Lorimer 2004; Lim et al. 2011). However, to date, the concept of try scoring has not been examined in the RFU Championship, where the majority of premiership academy players gain vital match experience. Therefore, the aim of this study was to identify the characteristics that lead to the scoring of a try. Twenty-eight competitive matches from the 2010/2011 RFU Championship were analysed using the SportsCode elite system (Sportstec). All tries were analysed utilising the following performance indicators; the possession starter and location, number of phases and placement location, all of which were recorded for one team when playing at home and away (Intra operator reliability – % error score 1.69%±0.01%). Due to the non-parametric nature of the data, a Mann Whitney U tests was utilised and identified no significant ($p<0.05$) differences between all performance indicators. However, a number of key findings were identified; during the 28 matches, a total of 116 tries were scored averaging 4.1 tries per game. Of the 116 tries, 40.52% were scored from the within the opponents 22nd and the ball was grounded 64 times in the 15 meter channels. The team scored 66% of tries from set-pieces and 61% of tries were scored within three phases. This study has reported the characteristics which affect build up and placement of tries, and identified that the analysed team had a greater chance of scoring a try when possession was gained from a set-piece on the right-hand side within the opponents 22. In addition this study has also provided an insight into the strategies utilised by a RFU Championship team during the build up to scoring tries.

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CRICKET

Op. 7.1

Analysis of team performance during the 2011 English County Cricket Clydesdale Bank 40 competition

Charles Garratt, Kelvin Beeching & John Francis

University of Worcester

Introduction

During recent years, the game of cricket has been revolutionised by the introduction of the shorter version of the game. Research into the shorter formats of the game by Petersen et al (2008a), who researched 50 over cricket matches, and Petersen et al (2008b) and Douglas and Tam (2009), studying the Twenty20 adaptation of the game, identified different predictors of success. In 50 over cricket winning teams scored more runs through boundaries, maintained a higher run rate and had more 50+ partnerships whereas in Twenty20 cricket, wickets had the largest positive outcome in terms of winning result. This information can influence both team and individual strategies during games. No research has been conducted into the 40 over games which forms the domestic competition in the UK. This study aims to address this and identify the game variables which have the largest impact upon match outcome in 40 over cricket.

A knowledge of the impact that differing match variables can have upon the outcome of the game can help to influence team and individual strategies during games.

Method

For the purpose of the project, scores from 101 of 129 games during the Clydesdale Bank 40 competition were analysed and the analysis included the data from all of the 21 participating teams. The game variables were broken down into three main headings of batting, bowling and general match variables. The magnitudes of differences of game variables were compared between winning and losing teams and were calculated using Cohen's Effect Size (ES).

Results

The top three indicators for success within the tournament were losing less wickets (ES= -1.54), hitting a greater number of 4's (ES= 0.81) and scoring at a higher overall run rate (ES= 0.76).

Conclusion

Team selection in 40 over cricket should consider these performance indicators and look to exploit differing game variables to enhance a team's chances of success. Game strategy should be revised in light of this research.

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HANDBALL

Op. 8.1

Relationship between score and verbal behavior of handball coaches

Vicente Calpe-Gómez, José Francisco Guzmán & Carles Grijalbo

University of Valencia

The way the coach act the most during the development of the game is giving information to their players, and this information provided by coaches during competition is influenced by process variables, contextual variables and product variables (Moreno, Moreno, Cervelló, Ramos and Del Villar 2004). The aim of this study was to analyze the relationship between a contextual variable, the score during the game, and verbal behavior of handball coaches in competitive situation. To do this, five coaches were analyzed in five games. Two variables were studied in that games, coach's verbal behavior and score, defining three situations in the second case: wide victory (WV), set score (SS) and wide track (WT). Coaches' verbal behavior was coded according to Coach Analysis and Intervention System (Cushion, Harvey, Lee and Nelson, 2012). Results showed significant differences in the coaches' verbal behavior depending on the

score (239.44; 40; $p < .001$). Specifically, 'general feedback positive' was most repeated in SS. 'Instruction' appeared more frequently and 'management-criticisms' less often in WV situation. 'Management-direct', 'confer with assistant' and 'question' were more repeated in the WT. Prevalence of confers with assistant and questions on WT situation represents low quality of verbal behaviour, which is consistent with Guzmán and Calpe-Gomez (2012), which reported that negative actions generated increasing doubts and insecurity in the coach. On the other side, the low number of management-criticisms and the high percentage of instructions on WV imply a high quality of intervention. Results confirm that having good results allows coaches to feel less pressed, enabling them to show a more relaxed and variable intervention (Moreno et al., 2004).

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Op. 8.2

Action sequence analysis in complex sport games

Norbert Schrapf

Institute of Sports Science, Karl-Franzens-University Graz, Austria

Introduction

The analysis of game situations in sports games is essential for the development of successful game tactics and planning of training. Carling (2008) suggested analyzing action sequences because the study of single actions only gives restricted insight into team's behaviour. The aim of the present study is to analyze action sequences in team handball to identify different offensive behaviours.

Methods

For the study 6 games from the EHF EURO Men 18 in Austria were recorded. Special categories for detailed annotation were defined to assess single actions which then can be merged into action sequences. With custom-made software allowing individual construction of categories, shots and up to 5 passes prior the shot were annotated. Out of 3212 actions each containing information about video time stamp and ground position the software generated 612 action sequences. To identify different behaviours, similar action sequences were summarized using artificial neuronal network software (Perl, 2002). Due to network-restrictions the dataset was enlarged with a noise of 15% to a quantity of 3060. Subsequently a network with a dimension of 400 neurons was trained. Each neuron represents a pattern in action sequence and similar neurons are grouped to clusters representing similar behaviour.

Results

The artificial network recognized 32 clusters with a similarity resolution of 70%, which defines the selectivity between similar and dissimilar neurons. 34 action sequences (5.6%) allocated to 10 neurons could not be classified to a cluster. Summarizing, 42 different offensive team behaviours (32 clusters and 10 single neurons) were identified whereby 8 clusters represented 50.8% of the actions sequences.

Conclusions

The study revealed the ability of the software to create action sequences and the potential to identify playing patterns with artificial neuronal networks. Expert review of the recognized patterns showed a promising accordance with the original data of the action sequences. Future steps will be the detection of preferred tactics of single teams and with integration of goal success, the differentiation of successful and unsuccessful offensive tactics.

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Op. 8.3**Time-motion analysis in women's team handball: importance of maximum oxygen uptake**

Carmen Manchado¹, Janez Pers², Fernando Navarro³, Ahreum Han⁴, Eunsook Sung⁴ y Petra Platen⁴

1 University of Alicante, Faculty of Education, Spain

2 Faculty of Electrical Engineering, University of Ljubljana, Slovenia

3 Faculty of Sport Sciences, University of Toledo, Spain

4 Ruhr University Bochum, Faculty of Sport Sciences, Germany

Introduction

Women's handball is a sport, which has seen an accelerated development over the last decade. Data on movement patterns in combination with physiological demands are nearly nonexistent in the literature. The aim of this study was twofold: first, to analyze the horizontal movement pattern, including the sprint acceleration profiles, of individual female elite handball players in combination with the analysis of heart rate profiles (HRs) as an indicator of individual physiological demands, and secondly, to assess the influence of maximal oxygen uptake on these parameters.

Material and Methods

Twenty-five elite handball players with different positions (3 goalkeepers, 9 backs, 8 wings and 5 pivot players) from a German First League team (n=11) and the Norwegian National Team (n=14) were studied during one match using the Sagit system for movement analysis and Polar HR monitoring for analysis of physiological demands. $\dot{V}O_2\text{max}$ and HRmax were determined during an incremental maximum intensity test on a calibrated treadmill. For the time-motion analysis, two video cameras were installed on the ceiling of the arena, approximately in the middle of each half field. After digitalization, the videos from the ceiling of the arena were further analyzed using the software program Sagit.

Results

Mean HR during the match was 86 % of maximum HR (HRmax). With the exception of the goalkeepers (GKs, 78 % of HRmax), no position-specific differences could be detected. Total distance covered during the match was 4614 m (2066 m in GKs and 5251 m in field players (FPs)). Total distance consisted of 9.2 % sprinting, 26.7 % fast running, 28.8 % slow running, and 35.5 % walking. Mean velocity varied between 1.9 km/h (0.52 m/s) (GKs) and 4.2 km/h

(1.17 m/s) (FPs, no position effect). Field players with a higher level of maximum oxygen uptake ($\dot{V}O_2\text{max}$) executed run activities with a higher velocity but comparable percentage of HRmax as compared to players with lower aerobic performance, independent of FP position. Acceleration profile depended on aerobic performance and the field player's position.

Conclusion

A high $\dot{V}O_2\text{max}$ appears to be important in top-level international women's handball. Sprint and endurance training should be conducted according to the specific demands of the player's position.

Op. 8.4

Historical, tactical and structural development in defensive system 4:2 in handball

Jose Julio Espina Agulló

University of Alicante, Spain

The aim of this study is to establish the guidelines evolutive and tactical about the Defensive System 4:2 in Handball. Since its born in the 60th in the old Czechoslovakia until today, it has produced logically modifications and advances physics, techniques and tactics.

In its evolution, as well, has influed by the application of this System in the Base Sport categories (Since "Alvin until Cadet", kids from 10 until 15 years old) like its use in situations six against five players (numerical superiority).

We begin its study to analyse graphically the subject's tactics more important, to look for its comprehension.

Op. 8.5**Comparative analysis of visual fixation of elite and amateur handball goalkeepers**

Jesus Rivilla García, Alejandro Muñoz Moreno, Ignacio Grande Rodríguez & Javier Sampedro Molinuevo

Department of Sports, Faculty of Physical Activity and Sport Sciences, Polytechnic University of Madrid, Spain

Introduction

Many of the crucial actions in handball are made at high speed, which implies that the reaction time is reduced and require visual strategies in advance so the action is performed. Achieving the right visual strategy requires an adequate visual fixation, which brings relevant information about the throw.

Sportspeople with a higher experience and competitive level seem to have default visual strategies, which allow them to predict and anticipate to the opponent's actions.

Taking into account the importance of visual fixation of handball goalkeepers with different competitive level and also the lack of research regarding this factor, a comparative study about the visual fixation of successful and amateur handball goalkeepers was carried out.

Method

The sample was composed of a non-random selection of 10 goalkeepers (29.7 ± 5.4 years, 14.7 ± 8.6 experience years) divided into two groups according to their competitive level: elite ($n = 3$) and amateur ($n = 7$).

The individuals were placed in front of the screen in which, after a period of familiarization, 14 shooting from 7 meters were shown. In order to analyse the areas of visual fixation on every pitch, the goalkeeper stood in front of a screen, which projected launches at real size. The Tobii X120 ® device was in charge of the eye tracking using high-speed cameras, tracking the movement of the eyeballs, the pupil dilation (pupillometry) and flashing the individual, among other factors.

Results and Discussion

Significant differences were found ($p < 0.01$) in the number of fixations between amateur goalkeepers (8.98 ± 1.83) and professional ones (16.25 ± 3.91).

In percentage terms, amateur goalkeepers focused over 12% on the face and over 7% on the legs / feet than professional goalkeepers. Professional Goalkeepers focused over 10% on arm / ball,

7% over the hip / trunk and 3% over the shoulders. The fixation on the face and lower limb is slightly higher than the half (55%) in the amateur goalkeepers while professional goalkeepers is one third (33%).

Conclusions

The competitive level is crucial for the number and areas of visual fixation. Professional players have a significantly higher number of fixations, which may mean that they are able to extract more information from each release. While amateur goalkeepers preferably focused on the face and leg, the professional goalkeepers focused on arm / ball, shoulder and hip.

Op. 8.6

Is the date of birth an advantage/ally to excel in handball?

Carlos Sánchez Rodríguez¹, Ignacio Grande Rodríguez², Javier Sampedro Molinuevo² & Jesús Rivilla García²

1 University of León

2 Department of Sports, Faculty of Physical Activity and Sport Sciences, Polytechnic University of Madrid, Spain

Introduction

Relative age effect (RAE) has been analyzed in numerous sports such as handball (Schorer et al., 2009; Sánchez-Rodríguez, Yañez, Sillero & Rivilla-García, 2012). Because of the annual age grouping the athletes who were born in the first quarter of the year have an advantage in young athletes. In fact, the physical, intellectual, motivational, emotional, experimental and developmental differences play a part in determining the possibilities to reach the pinnacle of the sport (Nolan y Howel, 2010). However, RAE has not been analyzed in the different categories of the national teams. Therefore, as RAE is a relevant factor and no investigation has been made about it, it would be interesting to discover how RAE affects to the national handball teams.

Method

161 athletes of the Spanish national handball team were divided: cadets (N=31), youth (N=33), junior (N=48) and senior (N=49). Date of birth and playing position of all men athletes who participated in the follow international championship were collected.

Frequency tables and percentages of the players were made based on their birth quarter (1st, 2nd, 3rd and 4th) and year of birth (odd or even).

Results and Discussion

All the categories analyzed demonstrated a heterogeneous distribution of the quarters of birth. There was a significant over-representation of athletes ($\chi^2 = 21,68$; $p < 0,001$) with birth dates in the first quarter of the year (40,7%). There was a significant over-representation of athletes ($\chi^2 = 13,72$; $p < 0,001$) with birth dates in even year (64,6%).

Conclusions

The quarter the athletes are born seems to be a determining factor to be part of the national handball team in all the categories. Those athletes who are selected to play in the national handball team have been born mainly in the first quarter of the year and in even year.

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POSTERS

TEAM SPORTS

SOCCER

Pos. 1.1

Association between passing sequences and offensive performance in spanish soccer national team in World Cup 2010

Joaquín González-Rodenas, Rafael Aranda, Ignacio López-Bondía & Ferrán Calabuig

Department of Physical Education and Sports. University of Valencia (Spain)

Introduction: Long possessions seem to be more effective to produce scoring opportunities if it is considered the frequency of the lengths of passing sequences (Hughes and Franks, 2005). The aim of this study was to analyse the influence of passing sequences on achieving scoring opportunities according to the startup type of possession in Spanish national soccer team in World Cup 2010.

Material and Methods: The sample was constituted by all ball possessions (n=761) that starts as restart (n=313) and recovery (n=448) during the seven matches played by Spanish soccer team in World Cup 2010. Strategic set play was excluded. An observational tool was developed “ad hoc” and validated by our research group and it was used for the analysis. The following variables were used in this study:

A.Startup type of possession: (1.Recovery possession: Starts when a player gains the possession of the ball by any means other than from a player of the same team while being the ball in play; 2. Set-play possession: Starts when a player restarts the game after a regulatory interruption where he has not the possibility of achieving goal by one or two strategic passes).

B.Passing sequence: (1. Short: 0 to 3 passes for possession; 2. Medium: 4 to 6 passes for possession; 3.Long: 7 or more passes for possession).

C.Offensive performance: (1. Scoring opportunity: When the observed team gets the possibility of scoring; 2. No scoring opportunity: The rest of possessions).

Chi-square analysis was carried out to determine if there is association between variables.

Results: Comparing startup types of possession with normalized data, significant association was observed between offensive performance when set-play possession only where considered,

which produced 4,2%, 10,2% and 13,3% of scoring opportunities from each short, medium and long passing sequences, respectively. On the other hand, recovery possessions did not show significant association with offensive performance. They produced 16,4%, 16% and 12,5% of scoring opportunities from short, medium and long passing sequences, respectively.

Conclusion: Spanish soccer national team during set play possessions produced more scoring opportunities from longer passing sequences than shorter passing sequences while no differences were found for recovery possessions.

References:

Hughes, M., & Franks, I. (2005). Analysis of passing sequences, shots and goals in soccer. *Journal of Sports Sciences*, 23(5), 509-514.

Pos. 1.2

Startup type of possession and offensive performance in spanish soccer national team in Sudafrica World Cup 2010

Joaquín González-Rodenas, Rafael Aranda, Ignacio López-Bondía & Ferrán Calabuig

Department of Physical Education and Sports. University of Valencia (Spain)

Introduction: The aim of this study was to analyse the influence of startup type of possession on offensive final outcome in Spanish soccer national team in World Cup 2010.

Material and Methods: The sample was constituted by all ball possessions (n=852) during the seven matches played by Spanish soccer team in World Cup 2010. An observational tool was developed “ad hoc”, validated by our research group and it was used for the analysis. The following variables were used in this study:

A.Startup type of possession (1.Recovery possession: Starts when a player gains the possession of the ball by any means other than from a player of the same team while being the ball in play; 2.Strategic set-play: Starts when a player restarts the game after a regulatory interruption where his team has not the possibility of achieving goal by one or two strategic passes. 3.Set-play possession: Starts when a player restarts the game after a regulatory interruption where his team has not the possibility of achieving goal by one or two strategic passes).

B.Offensive final outcome: (1.Goal scoring: Scoring opportunity ending with a goal; 2. Scoring opportunity: There are situations where the team has the possibility of scoring during the

possession; 3. Penetrative possession: Team is able to arrive at opponent's defensive zones according to effective game space with enough space and time to make a deliberate decision. No penetrative possession: Rest of possessions).

Chi-square analysis was carried out to determine if it exists association between variables.

Results: Significant association has been found between both variables. On the one hand, Spanish national team, when playing recovery possessions achieved goal scoring (1,1%), scoring opportunity (29,7%), penetrative possession (6,6%) and no penetrative possession (62,6%). On the other hand, when playing set-play possessions achieved goal scoring (0,3%), scoring opportunity (8,6%), penetrative possession (21,4%) and no penetrative possession (69,6%). Finally, when playing strategic set-plays achieved goal scoring (1,3%), scoring opportunity (14,1%), penetrative possession (31,5%) and no penetrative possession (53,1%).

Conclusion: In Spanish soccer team, strategic set-play possessions were more effective than recovery and set play possession to achieve scoring opportunities while recovery possession were more effective than strategic set-play and set-play possession to achieve penetrative possessions and goal scoring.

Pos. 1.3

Playing tactics on goal scoring in Real Madrid C.F. In the BBVA League 2011-2012

Ignacio López-Bondía, Rafael Aranda, Joaquín González-Rodenas & Ferrán Calabuig

Department of Physical Education and Sports. University of Valencia (Spain).

Introduction: The aim of this study was to describe the playing tactics on goal scoring by Real Madrid C.F. (RMCF) in the BBVA League 2011-2012.

Material and Methods: The sample was constituted by all ball possessions starting with a recovery of the ball that concluded in a goal scoring (n=53) during thirty-two matches played by RMCF soccer team in BBVA League 11-12. Restart and strategic restart possession were excluded. An observational tool developed "ad hoc" and validated by our research group was used for the analysis. The following variables were used in this study:

A. Team starting position and B. Opponent starting position: Team and opponent team height position on the field when the ball possession starts. (1 Advanced; 2 Backwards).

C. Initial defensive balance of the opponent: Number of players of the opponent team that are in front of the player who possesses the ball.

D. Initial penetrative action: If the first action of the observed team gets over the first defensive line of the other team (1. Penetrative; 2. No penetrative).

E. Duration: Time in seconds that the team possession lasts.

F. Number of players: Number of players that take part in the team possession.

G. Number of passing: Number of passes that the team possession includes.

H. Penetrative passes: Number of passes that penetrate an opponent defensive line.

I. Score Pentagon: Number of opportunities that ended on the score pentagon. (1 Score pentagon; 2 No score pentagon).

J. Type of shot: Number of contacts to shot (1. 1 touch, 2. 2 or more touches).

A descriptive analysis was carried out to show the means and percentages of the variables studied.

Results: RMCF started 51% of the goal scoring possessions with advanced position while opponent team started 81,1% with advanced position and $7,5 \pm 2,1$ players behind the ball. Besides, this team performed penetrative actions 67,9% of the initial behaviours. On the other hand, RMCF goal scoring possession lasted $15,5 \pm 9,8$ seconds and participated $4,5 \pm 1,7$ players. Also, this team performed $4,6 \pm 3,3$ passes and $2,6 \pm 1,4$ penetrative passes per possession. Finally, RMCF scored 94,3% of the goals inside the score pentagon and 52,8% performed two or more ball touches to shot.

Conclusion: Real Madrid CF goal scoring possessions had high percentage of opponent advanced position, initial penetrative actions, short duration, low number of passes and players and high percentage of penetrative passes.

Pos. 1.4

Differences of offensive tactics on achieving scoring opportunities by Real Madrid C.F. & F.C. Barcelona in the BBVA League 2011-2012

Ignacio López-Bondía, Rafael Aranda, Joaquín González-Rodenas & Ferrán Calabuig

Department of Physical Education and Sports. University of Valencia (Spain).

Introduction: The aim of this study was to compare the effect of playing tactics on achieving scoring opportunities by Real Madrid C.F. (RMCF) and F.C. Barcelona (FCB) in the BBVA League 2011-2012.

Methods: The sample was constituted by all ball possessions starting with a recovery of the ball that concluded in a scoring opportunity (n=502) during thirty-two matches played by RMCF (n=268) and FCB (n=234) in BBVA League 11-12. Restart and strategic restart possession were excluded. An observational tool developed “ad hoc” and validated by our research group was used for the analysis. The following variables were used in this study:

A. Team starting position and B. Opponent starting position: Team and opponent team height position on the field when the ball possession starts. (1 Advanced; 2 Backward).

C. Initial defensive balance of the opponent: Number of opposing players between the ball and the goal.

D. Initial penetrative action: If the first action of the observed team gets over the first defensive line of the other team. (1.Penetrative; 2. No penetrative).

E. Duration: Time in seconds that the team possession lasts.

H. Number of players: Number of players that take part in the team possession.

I. Number of passing: Number of passes that the team possession includes.

J. Penetrative passes: Number of passes that penetrate an opponent defensive line.

K. Score Pentagon: Number of opportunities that ended on the score pentagon. (1 Score pentagon; 2 No score pentagon).

Analysis of variance and Chi-square analysis was carried out to determine whether it exists association between variables.

Results: RMCF and FCB began scoring opportunities possession with advanced position (70,5% and 76,5%, respectively) and against teams with advanced position (63,4% and 57,3%, respectively). Besides, RMCF obtained high percentage of initial penetrative action (63,8%) more than FCB (47,4%) ($p<0.001$). On the other hand, FCB in comparison to RMCF performed longer possessions (20,84±15,5 vs 15,9±11,7 seconds) ($p<0,001$), more number of players (4,9±2,3 vs 4,2±1,9) ($p<0,001$), number of passes (6,1±5,4 vs 4,4±3,9) ($p<0,001$) and penetrative passes (2,5±1,9 vs 2,2±1,5) ($p<0,05$). Finally, FCB finish more scoring opportunities inside the score pentagon than RMCF (82,5% vs 69,4%) ($p<0,001$).

Conclusion: FCB in comparison with RMCF is less penetrative at starting but more penetrative in the end of the possessions, using more time, passes and players during the possessions.

Pos. 1.5**Video analysis as an instrument in juvenile soccer training**

Daniela Tursi, Salvatore Napolitano, Loris Polidoro & Gaetano Raiola

University of Salerno

One of the most important variables for action efficiency in soccer is the time an athlete takes to carry out a certain movement. In soccer it is particularly adequate considering development of motary capacity for technical characteristics, space and game rules, where time analysis, evaluation, elaboration and execution is limited with respect to other group sports. This is the reason why it can be considered particularly adequate regarding players 8-10 years of age, in order to gain and develop the specific techniques of the game. Furthermore, motary imagination can favor qualitative motary learning if it is added in the weekly training program. The goal of the study is to compare two sample groups and to verify if the group who followed a training program in which filmed footage of themselves or of model motary executions was shown better learned specific techniques as compared to the group to whom no footage was shown.

The sample group will gather at the sports center 30 minutes prior to the control group. Filmed footage regarding three of the technical movements of the game will be shown:

1. Control of the ball: stopping with the sole of the foot
2. Guiding the ball: Moving the ball with the sole
3. Shooting: Kicking the ball

After having seen the footage, the group will carry out the same technical movements while they themselves will be filmed for later evaluation.

Phase two involved highlighting the improvements of each single player of the sample group and comparing those results to those gathered before the start of the study. From the data we can note a net average improvement of the sample group (7.4%) with respect to the controlled group (+2.1%), creating a hypothetical precautionary tendency for the third, and final phase of the study. In particular, the second evaluation highlighted a significant improvement in those who held a good starting point (11%).

From the data collected we can hypothesize greater incisiveness in the “video motary” system in those who possess good technical ability to begin with, and thus a lesser phase regarding correction and adjustment to technical movements after the visualization of the executive

technical model. The data tends to suggest further technical improvement and perfection in subjects who showed considerable progress during phase two of the study, and a greater difference between the sample group and the control group ($> 5\%$).

Pos. 1.6

Efficiency and biomechanical analysis of kicking ball in soccer eight

Marcelo Alejandro Jove Tossi, Fernando Nicolás Rodríguez & Salvador Petrel Moll Exposito

University of Alicante

The research was conducted in three soccer teams' young Hercules Alicante. The aim is to analyze the influence and variations in the speed of the mobile hit.

We analyzed 45 participants, age of participants was 11 ± 1.2 , divided into three groups, A = Experimental, 15 participants, B and C = Control group, consisting of 15 participants each group. To test the relationship between the biomechanics of football scrimmage gesture in pieces position, and power generation ($P = FV$), in relation to the size variables weight, wingspan, SJ and CMJ.

The average speed of group 1 was 76.5 ± 1.6 , with a standard error of 0.7, while for group 2 was $70.7 \pm$ average mistakes of 1.3 and 0.6 and in group 3 was 70.6 ± 3.4 and the average score with a very high standard error of 1.6.

The inter-group difference by the sum of the squares of the groups gave significant differences ($P \leq 0.05$).

Significant difference was found in group 1 compared to group 2 and 3. In both group 2, has significant difference with group 1, with ($P \leq 0.05$) but not with respect to the Group has three, in this case the difference is 0.996. While statistical comparison of group 3 compared to group 1, we see again that there is significant difference where ($P \leq 0.05$), and finally, between group 3 and 2 no significant differences.

Group 1 with treatment, improved significantly from the control groups 2 and 3, which had no treatment. We can assert that the treatment had a positive effect on the Group 1, showing the player biomechanical efficiency. Taking as reference the pre-test and post-test. The results are important when making treatment by a trainer, the effects were as expected, marking statistical analysis significant differences between the experimental and control groups.

VOLLEYBALL

Pos. 2.1

Movement behaviour of young volleyball players during the blocking

Nieves María Saez Gallego, Jorge Abellan Hernandez, Sara Vila Maldonado & Onofre Ricardo Contreras Jordan

University of Castilla-La Mancha

Introduction: Task analysis had been a popular topic in sports sciences, especially in volleyball. Blocking was one of the most important actions on volleyball, even correlate with the final ranking (Lobiatti, 2009). The principal aim of this study was to examine movement behaviour of volleyball player during the block action in an in situ test. We examined differences between different destinations of the ball, namely zone three and zone four in the volleyball court. Additionally we investigated key differences between successful and non successful performances. **Material and Methods:** Thirty-two young volleyball players (mean age=17,41; SD=0,87; mean experience= 5,45; SD=2,08) took part in this study. The experiment involved evaluating a total of 640 attacking sequences. Volleyball players were required to block a ball to zone 3 and zone 4 (10 each). They were instructed to perform like they would do in a real match. The test was recorded by video and their movement behaviour was analysed frame by frame. Dependent variables were: the time between 1,5 seconds before the setter touch the ball and 0,04 seconds before the blocker start to move (Reaction Time); the time between the blocker start to move and the initiation of their jump (Jump Time); the time between the blocker start to move and the blocker finish the block action, namely the ball pass their hand's area (Movement Time). Four different groups were created in base of the performance: Successful, correct, mistake and wrong decision. For each dependent variable separately, a one way ANOVA was carried out with Alpha level set at 0.05. Also, a Bonferroni test was carried out in order to explore significant differences. **Results:** In correct executions within zone 3, volleyball players start to jump earlier than in wrong decision trials. Reaction Time in zone 4 is longer in trials with a wrong decision in comparison with correct and mistake trials. Jump Time in zone 4 is shorter in mistake trials than in correct executions. Movement Time is significantly shorter in wrong decision trials. **Conclusions:** wrong decision trials were characterized by a longer reaction time and consequently a shorter movement time.

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BEACH VOLLEY

Pos. 3.1

Type of attack used for under-19, under-21 and elite male beach volleyball players according to player role

Alexandre Medeiros¹, Rui Marcelino¹, Isabel Mesquita¹ y José M. Palao²

1 University of Porto (Portugal)

2 University of Murcia (Spain)

Introduction: In beach volleyball, the attack is the action considered an offensive weapon in which one team obtains more points¹. In indoor volleyball, the attack is executed mainly using the spike. However, in beach volleyball, due to surface instability and weather conditions (wind, sun, 32 m² per player, etc.), players often use either the spike or the shot. In beach volleyball, there are two player roles, according to their action in defense, defender and blocker, which affect their physical characteristics². There has not been found information in the literature related to the way of the execution of the attack in relation to role player and age group. Thus, the purpose of this study was to determine the types of attacks used in categories under-19, under-21 and elite according to player role (blocker and defender). **Methods:** A total of 777 attacks (30 games) from Under-19, 713 attacks (24 games) from Under-21, and 1281 attacks (42 games) from Elite were analyzed. Actions were collected from their respective World Championships (season 2010 and 2011). Analyzed sets were selected randomly according to the teams' level and their confrontation. Only side-out attack from first and second sets of the matches was included. The variables studied were: type of attack (spike and shot), player role (defenders = DF & blockers = BO), and age groups (U-19, U-21 and Elite). Chi-square test was used to test differences between analyzed variables. **Results:** Results show that in all categories, there are no differences ($p > 0.05$) between types of attack according to player role. In the U-19 category the types of attack were: spike (DE = 38.9% vs. BO = 40.2%) and shot (DE = 61.1% vs. BO = 59.8%). In the U-21 category the types of attack were: spike (DE = 43.1% vs. BO = 43.3%) and shot (DE = 56.9% vs. BO = 56.7%). In the elite category the types of attack were: spike (DE = 50.2% vs. BO = 52.4%) and shot (DE = 49.8% vs. BO = 47.6%). **Conclusion:** The present study showed that blockers and defenders do not differ in the manner of attack in the different age groups studied. The role and anthropometric characteristics of beach volleyball

players does not affect the way of the attack executed by the players. Acknowledgments: This research was supported by Capes-Brazil (068812-6/2012).

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Pos. 3.2

Type of serve used for under-19, under-21 and elite male beach volleyball players according to player role

Alexandre Medeiros¹, Rui Marcelino¹, Isabel Mesquita¹ & José M. Palao²

1 University of Porto (Portugal)

2 University of Murcia (Spain)

Introduction: In net sports, the serve is the technical action that starts the game. The server's goal is to get a direct point and create difficulties in the opponent's actions¹. As in indoor volleyball, the serve in beach volleyball is executed primarily using the standing, jump and float jump serve. In beach volleyball, there are two player roles, according to their action in defense, defender and blocker, which affect their physical characteristics². There is no information in the literature related to the way of the execution of serve in relation to role player and age group. Thus, the purpose of this study was to determine types of serves used in categories under-19, under-21 and elite according to player role (blocker and defender). **Methods:** A total of 1100 serves (30 games) from Under-19, 927 serves (24 games) from Under-21, and 1564 serves (42 games) from Elite were analyzed. Actions were collected from respective World Championships (season 2010 and 2011). Analyzed sets were selected randomly according to the teams' level and their confrontation. Only side-out serves from first and second sets of the matches were included. The variables studied were: type of serve (standing serve = SS, jump serve = JS, & float jump serve =FJS), player role (defenders = DF & blockers = BO), and age groups (U-19, U-21 and Elite). Chi-square test was used to test differences between analyzed variables. **Results:** Results show that in all categories, there are significant differences ($p = 0.001$) between types of serve according to player role. In the U-19 category the types of serve were:

SS (DE = 21.6% vs. BO = 31.3%), JS (DE = 43.6% vs. BO = 19.9%) and FJS (DE = 34.7% vs. BO = 48.8%). In the U-21 category the types of serve were: SS (DE = 28.6% vs. BO = 18.5%), JS (DE = 34.7% vs. BO = 20.5%) and FJS (DE = 36.7% vs. BO = 60.9%). In the elite category the types of serve were: SS (DE = 6.2% vs. BO = 27.2%), JS (DE = 33.9% vs. BO = 19.1%) and FJS (DE = 59.8% vs. BO = 53.7%). **Conclusions:** The present study showed blockers and defenders use different types of serve in the different age groups studied. Defender players, with a theoretical lower number of block jumps, used more JS. Blockers use more SS and FJS. **Acknowledgments:** This research was supported by Capes-Brazil (068812-6/2012). **References:** 1.Homberg S, Papageorgiou A. Aachen, editor: Meyer & Meyer Verlag; 1995. 2.Palao JM, Gutierrez D, Frideres JE. Journal of Sports Medicine and Physical Fitness. 2008;48(4):466-71.

WATERPOLO

Pos. 4.1

Water polo women's pattern tactical experience of an italian team

Salvatore Napolitano, Daniela Tursi & Gaetano Raiola

University of Salerno

In water polo lacks a codified methodology for tactics training, which is thus only left to coach's discretion.

Nine women water polo matches, during season 2011/2012 (Italian female Serie A1), have been analyzed by a water polo coach, helped by a statistician and a performance analyst. Purpose of the analysis process was to identify single events during the matches, to examine the tactical pattern implemented in this events, to obtain by the coach an evaluation on tactical pattern compliance and then to put this compliance in relation to event's outcome. Aim of the work is to verify the efficacy of different attack patterns, when they were well-performed, in order to create a codified methodology for teaching water polo through tactics.

The research approach is integrated and consists of 3 distinct methods: case study (9 matches of the Italian Serie A1 Women's Championship, season 2011/2012, played by the Volturno sc) for the analysis of matches, action research method for coach contribution, and theoretical-argumentative method to deduce a theoretical framework in which define the data processing.

The research team examined matches with Dartfish TeamPro, isolating single keyframes relative to attack events, identifying the implemented attack pattern, then the coach expressed an evaluation on attack pattern compliance.

The results showed a general efficacy of tactical patterns (when they are well performed), but showed significant differences within correlation coefficients of single patterns, confirming the need for developing a common methodology for teaching waterpolo through tactics.

BASKETBALL

Pos. 5.1

Loglinear analysis of basketball shooting performance

Gábor Csátraljay¹, Mike D. Hughes², Nic James² & Henriette Dancs¹

¹ University of West Hungary, Savaria Campus, Institute of Sport Sciences, Hungary

² Middlesex University, London Sport Institute, UK

Previous research in basketball has identified performance indicators that distinguish winning and losing teams as usually based on outcome variables. Many of the authors emphasized the importance of 2 point and 3 point shooting performance as distinguishing factors that contribute to successful team performance. However a better understanding of the processes that lead to better shooting performance would provide the reasons behind success. Consequently data collection and analysis on process variables would potentially enable a more comprehensive explanation for performance differences.

3331 shooting attempts were notated using Focus X2 software from 52 team performances of 26 games of a Hungarian first division basketball team in the regular season of 2007/2008. Shooting attempts were grouped into successful and unsuccessful shots from 3 different shooting distances of winning and losing teams. Types of defensive pressure were also recorded for each shooting attempt. Data were processed in Excel and SPSS 18 statistical software. Loglinear analysis was used to identify relationships between winning or losing team performance, type of the defensive pressure and successful or unsuccessful shots from several distances; and to explain the effects of the defensive pressure on the shooting efficiency and team success.

The results of the current analysis also identified strong relationship between shooting percentages and team performances. The more effective shooting of winning teams was found as the consequence of better team cooperation as players could work out more opened scoring opportunities without any active defensive presence. The other occasion of the higher shooting percentages was the level of defensive performance because winners more times forced their opponent to try under maximal defensive pressure. After all, perhaps the most important difference between winning and losing teams was that winners could exploit their scoring opportunities more effectively from each distances, not only without defensive opposition but form the hardest situations under high level of defensive pressure also.

INDIVIDUAL SPORTS

TRIATHLON

Pos. 6.1

Chronological vs morphological age in young triathletes and swimmers

Miguel Tonda Quesada, Moisés Picón Martínez, Víctor Estes de Lamo, Mario Cerdá Martínez, Paco Castillo Villalonga & Roberto Cejuela Anta

University of Alicante

Knowledge of the age of children's development is important for a correct planning of the training. The objective of the study was to compare the chronological age and morphological age in triathletes and young swimmers. 15 swimmers and 15 triathletes (14.45±1.38 years) of the talents of the Valencian Community (Spain) development program. Morphological age was calculated using anthropometric measurements according to the Protocol of the ISAK and application of the calculation of the index of modified morphological age of Siret et al. (1985). The results show how athletes are distributed among 3 biological States (1/3 Advanced, 1/3 normal and 1/3 retarded). Ages who have more disparity are 14 and 15 years with 1.35 years greater morphological development. There are significant differences between genders in the values of height but not in diameters biacromial and bicrestal, or between triathletes and swimmers. Coaches should plan loads of training on the basis of the morphological age in

young athletes, significant differences exist environment to the maximum peak of growth between the morphological and chronological age, this age a sensitive period of training to improve the performance.

OTHER SPORTS

ROWING

Pos. 7.1

Comparison of performance in a resistance test in rowing-table exercise with and without control of speed execution using a metronome in female fixed bench Mediterranean rowers

Alejandro Javaloyes Torres, Carlos Clement Requena, Gregorio Bueno Sempere, Alberto David Martínez Hernández, Óscar Miguel Álvarez & Roberto Cejuela Anta

University of Alicante.

The purpose of this study was to evaluate the power obtained in performing the rowing exercise table using and not using a metronome to control the speed, in order to compare the data obtained by the use or non-use of metronome in three rhythms of different speed relative to the maximum speed of each performer in two different intensities, 40 and 60% on the value of each subject's 1RM. 13 rowers participated in this study. After determining their 1RM rowing-table exercise in the first session, the maximum rate of metronome that could perform each performer during the concentric phase in each of the two intensities proposals was calculated, selecting the three repetitions in which obtained the highest measured power values using a linear encoder, choosing the average time for obtaining the maximum value of the metronome rate, to establish three execution rates, relative to the maximum rate (90, 70 and 50%). In two subsequent sessions, subjects had to perform 5 repetitions on the maximum rate in the two selected intensities. They were noticed to end each phase (concentric or eccentric) with the metronome sound consecutively, and also to start whenever they wanted. A linear encoder was attached to the bar for measuring the power generated in each repetition, selecting the top three repetitions to calculate the average power generated in each of the different protocols proposed. The results

showed that using a metronome is particularly useful for controlling the speed of lifting, especially in higher intensities (60%) than in lower (40%), finding a high correlation to lower load levels (0,842) and low correlation to higher load levels (-0,428).

SWIMMING

Pos. 8.1

Comparison of the economy of swimming with wetsuit or no wetsuit

Roberto Cejuela Anta, Nelson Jesús Molina Cabeza, Iván Romero, David Pascual, Juan María Ortola & Alejandro Javaloyes

University of Alicante

The economy or energy efficiency represents the ability to spend less energy at a particular speed or power (Esteve-Lanao, 2009). Unlike cycling, swimming and running the mechanical power cannot be measured directly, so that the concept of efficiency is often replaced by the economy. This is defined as the VO₂ necessary for running or swimming at a certain speed. The objective of this case study was to compare the economy of swimming with and without use of wetsuits. An elite triathlete performed two test of 200m to the swimming to 90% of its best mark in the distance. The VO₂ was measured during the test (COSMED K4 b2 Aqua Trainer) heart rate, stroke rate and stroke length. The values of VO₂ (55 vs. 50 ml.kg⁻¹.min⁻¹) and heart rate (164 vs. 159 bpm) were significantly lower when they swim using wetsuit. Also the value of stroke rate (42.4 cycles/min) was lower and the stroke distance (1.18 vs 1.25 m) increased its value using wetsuit. The use of wetsuit in swimming improved swimming economy and technique in a triathlete's elite at a similar speed of swimming.

Pos.8.2**Review of methods to the determination of the VO2 Max and the anaerobic threshold in swimming**

Luis de Frutos Barroso, Francisco Muñoz Palomares & Roberto Cejuela Anta

University of Alicante

There are few research studies that determine directly the VO₂max in swimming due to the methodological complication of its measurement. The objective of this study was to review the literature on different methods to determine the vo₂max and the UAN in swimming. There is only one model of gas analyzer that can be measured in the water (K4b2 acuatrainer by Comed). The first measurements of vo₂max was through a test of 200m at maximum intensity (requires et al., 2007). Subsequently 3 incremental protocols are proposed: 200m series to exhaustion, with increments of 0.05 m/s, with recovery of 30" (Fernandes et ael. 2008). 8 x 200 with 5 "of recovery. The first series is 35 "above the best personal mark and then will be reduced 5" in each series (Sperlich et al. 2011). 3 replicates (200, 300 and 400 m) with an increment of speed 0.05 m/s and 30 "recovery intervals (Fernandes et al. 2012). All the protocols they are complemented by measuring lactate. Measuring the vo₂max in a single series of 200 meters does not show correct values of the same. The VO₂max is obtained from 3-4 minutes have begun the exercise therefore, incremental protocols similar to this duration can be best suited to determine this parameter.

PYSICAL ACTIVITY AND HEALTH

Pos. 9.1**The benefits of a physical activity intervention for people with mild cognitive impairment**

Juan Tortosa Martínez, Nuria Caus Pertegaz & Celeste Martínez Canales

Universidad de Alicante

INTRODUCTION: There is increasing scientific evidence about the benefits of physical activity for preventing, delaying the onset and the progression of Alzheimer's disease (AD) (Taaffe et al. 2008; Lautenschlager et al. 2008). However studies focusing on Mild Cognitive Impairment (MCI), usually a previous stage to AD, are very limited. Here we present the results of a group-based aerobic program for people with MCI. **METHODS:** A quasi-experimental pretest-posttest design was implemented with a group of 10 people with MCI who performed 3 aerobic sessions of moderate intensity per week during 3 months, and a control group of another 10 people with MCI who followed routine care. Sessions lasted for one hour including warm up and cool down. Patients were recruited by the neurologists of the Hospital de San Vicente (Spain). Fitness tests included: the Six-Minute Walk Test (6MWT), the Timed Get Up and Go Test (TGUG), the Tinetti test, and the 8-meter walk test. Statistical analysis were performed using the SPSS-19 statistical package version. Non-parametrical tests were used. **RESULTS:** The experimental group improved significantly in the 6MWT, the TGUG, and the 8-meter walk test, while the control group did not improve. There were no significant differences in the Tinetti test between the pre and post test of either group. **CONCLUSION:** The program improved the aerobic capacity and functional mobility of the patients who followed the exercise program, but did not improve balance. There is a need for randomized controlled trials to replicate these results with larger samples and compare physical improvements with cognitive performance.

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Pos. 9.2**The influence of standard or dynamic warm-up in power exercise leg-press**

Nuria Davo Berenguer, Juan Miguel Ilorca Domenech, Marcos Marín Bautista, Antonio Ruiz Giménez & Roberto Cejuela Anta

University of Alicante

The warm-up has the body for sport practice. The objective of the study was to analyze the influence of two types of warm-up (dynamic and standard) in power exercise leg-press. 19 (14 male, 6 female) Sport Science students (20, 2±1,8 years) (BMI 23±1,5) they were divided into 3 groups for two weeks; experimental group 1: week 1 Dynamic WUp and week 2 standard WUp; experimental group 2: week 1 standard WUp and week 2 dynamic WUp, control week Group 1 and 2 standard WUp. All the warmups were supervised. The test consisted of performing the highest number of repetitions (8 maximum) with a submaximal load to failure (Bryzcki, 1993). I have not have produced significant differences between groups. If there have been differences between the results of the test each week in all groups. There are no significant differences in the performance of the test of 1RM in the exercise leg-press, with different types of warm-up applied. The same warm-ups with a pilot phase of longer duration and a greater number of subjects should be studied to verify these results.

E-POSTERS

TEAM SPORTS

SOCCER

E-Pos. 1.1

Analysis of movement patterns among football referees in the 2012 Malaysian Cup

Rahmat Adnan, Nasriq Muzayin & Norasrudin Sulaiman

Faculty of Sports Science and Recreation University Technology Mara (UITM), Malaysia

Introduction: Referees and players possess different types of abilities and responsibilities during a match that requires specific demand of physical and psychological attributes (Da Silva, 2011). After time has passed, the number of distance that is covered by a referee in a single match of football have steadily increased, proving that this group must obtain a considerably good physical attributes in order for them to follow the intensity of the game. Thus, this study is to determine the contributing factors of the movement patterns toward the total distance covered by the football referees during the Malaysia Soccer Cup 2012. Seven (7) of referees who officiated the 2012 Malaysian Cup matches were chosen for this study with all of the subjects are male football referees with qualified by the Fédération Internationale de Football Association (FIFA). Seven matches from the tournament were analyzed using Sportcode Elite Software to analyze the selected performance indicators (P.I) as main movement patterns variables. This movement patterns were categorized as forward walking, forward jogging, forward running, standing, backward walking, backward running and sidestep running. The results analyze the frequency and the total time from the executed movement patterns for correlation and regression analysis by using the Pearson correlation and linear regression test respectively. The Pearson correlation test have shown that there is significant correlation between three movement patterns and the total distance covered by the referees which are sidestep($r= 0.97$, $p=0.000$, $p<0.01$), forward walking ($r= 0.930$, $p=0.002$, $p<0.01$), and forward running ($r= 0.807$, $p=0.028$, $p<0.05$). The linear regression test have shown a positive correlation between contributing factors of the movement patterns towards the total distance covered by the football referees where the total distance covered result is $132.161 + 2.012(\text{sidestep}) - 4.575(\text{forward walking}) + 0.570(\text{forward jogging}) - 2.940(\text{forward running}) + 1.404(\text{backward walking}) + 3.328(\text{backward running})$. Hence, this study found that movement

patterns that performed by referees are contributed towards the total distance covered by football referees during a match. Thus, this study can give added values to Football Association of Malaysia (FAM), to consider the three significant movement patterns in designing physical fitness criteria for the referees.

BEACH VOLLEY

E-Pos. 2.1

Effect reception on attack in female beach volleyball teams

Ana Belén López Martínez¹, Jose Manuel Palao André² & Enrique Ortega Toro³

1 Universidad Católica de San Antonio de Murcia

2 Universidad de Murcia

3 Universidad de Murcia

The analysis of technical actions of beach volleyball (serve, reception, set, etc.) are what allow maximize performance. One technical actions that obtain greater success is attack 1. If the action preceding (reception) the attack are good this can be made on the best possible terms. We found no studies that analyze the actions preceding the attack in beach volleyball. So we set the following aims: to know if the output of the reception conditions at the attack and b) determine how they affect the output of the reception and the result of the attack game. A total of 2647 receptions and 2439 attacks of 71 sets in women's teams from the 2008 Beijing Olympics Games. The variables studied were: a) reception (area and efficiency), b) type of attack and effectiveness, and c) the result of the game. The observation instrument was TEBEVOL3. Statistical analysis used the command chisquare Crosstabs and Pearson. The reliability was 0.93 and 0.98 inter-observer intra-observer. The result show that most of the errors occur when the attack takes place in the reception area of the field two. When the reception was perfect the spike was the most errors committed. When the effectiveness of the reception was perfect point with both types of attack showed similar values of use. The shot was the largest webbed continuity situations generated regardless at the reception area. When the play was lost it was in situations where the reception took place in remote areas with the completion of an spike. The results show that the effectiveness and reception area determine the effectiveness of the attack. A perfect reception facilitate the player to maximize options and performance confirms the hypothesis of attack. This effectiveness terminals actions depends on the actions of

continuation. It would be interesting to know the causes of these results to the application practice as realistic as possible. Work tactical kick and quantification of training actions versus actions continuity terminals would be some possible applications.1.Mesquita y Lacerda, 2003.2 Palao y Manzanares, 2009.

INDIVIDUAL SPORTS

MARTIAL ARTS

E-Pos. 3.1

The use of hyperoxia as a way to accelerate the recovery after the karate and judo match

Martin Pupiš, Miroslav Sližik & Pavol Bartík

Faculty of Humanities Matej Bel University Banská Bystrica, Slovakia

Aim: The research deals with the possible use of hyperoxia as a way to accelerate the recovery after the anaerobic exercise in judo and karate.

Methods: The experimental sample consisted of 23 athletes (14 karate, 9 judo) aged approx. 22 years. All monitored athletes went through the match load before and after which they had inhaled the air out of the oxygen inhalator. Each of them entered four matches, after two of them the placebo was used to be inhaled and after two the oxygen concentrate (95±4% of oxygen in the inhaled air). We monitored the value of lactate level after the match load and also in the third and the tenth minute after the match ended.

Results: The average value of lactate level after the match before which the athletes inhaled the oxygen concentrate reached 10,44 (SD – 2,76) mmol.l⁻¹ compare to the value of the lactate level after the match before which the placebo was inhaled 10,43 (SD – 2,92) mmol.l⁻¹, in this case the difference was 0,0009%, while there was no statistically important difference marked.

Statistically important difference (p<0,05) was marked just after tree minutes period of recovery, when after the hyperoxic inhalation monitored athletes reached the average value of lactate level 8,53 (SD – 2,82) mmol.l⁻¹ 18,12% decrease, while after the placebo inhalation 9,06 (SD – 2,98) mmol.l⁻¹ with (13,4% decrease). In the tenth minute of recovery we monitored after the hyperoxic concentrate inhalation the average value of lactate level 6,65 (SD – 2,31) mmol.l⁻¹, which means decrease compare to after match rate in 36,3%, while after the placebo

inhalation we monitored average value of lactate level 7,73 (SD – 2,39) mmol.l⁻¹, here we marked the statistically important difference (p<0,05) between the dynamic of lactate increment after the hyperoxic concentrate inhalation and an air inhalation.

Conclusion: The hyperoxic concentrate inhalation before the match has no statistically important impact (p<0,05) on the value of lactate level after the match load. We can state here that the hyperoxic concentrate inhalation has statistically influenced (p<0,05) the dynamics of the lactate decrease in the third and the tenth minute of recovery. Based on our findings we consider the hyperoxic concentrate inhalation as a suitable method for recovery after the judo and karate match.

E-Pos. 3.2

Reliability & linearity of an electronic body protector employed in taekwondo games: a preliminary study

Niki Tasika & Apostolos Theodorou

University of Athens – TEFAA

Introduction: An official electronic body protector (EBP) adopted by the World Taekwondo Federation should be capable of registering a valid kick or punch on its surface. This requires both, the necessary degree of accuracy and consistency in securing the same result under similar conditions. The purpose of this study was to assess the repeatability and linearity of a commercially available taekwondo EBP.

Material and Methods: A commercially available EBP that registers the energy (E) of a hit in Joules was placed unfolded on a hard non-deformable surface (British standards, 2000). Ten potential "hit" areas were marked on the EBP's surface. To simulate kicking conditions a 4 kg iron shot attached to a switch operated electromagnet was systematically released against the EBP from three randomly selected heights (1.78m, 1.92m, and 2.00m). The shot was released 5 times repeatedly from each height on each of the 10 areas. The procedure was repeated after a 30min interval. A total of 100 trials were performed for each height of release and a total of 300 E values were recorded. Reliability was assessed by the test-retest method using Chronbach's alpha, Guttman split half and ICC, and the coefficient of variation (%CV).

Results: The overall (10 sites pooled together) CV was 4.8%. The CV's for the three heights of release were 5.47%, 4.77%, and 4.18%, respectively. For the 10 separate analyses (one for each

of the 10 EBP sites) CV ranged from 2.5% to 11.6%. For the 10 separate analyses (one for each of the 10 trials) CV ranged from 6.8% to 11.6%. Subsequent analysis revealed an overall reliability between the 30 trials (across the three heights of release) as follows: Chronbach's $\alpha = 0.979$, single measure ICC = 0.572, average measure ICC = 0.976 ($p < 0.001$).

Conclusion: Testing revealed that the inter-trial and inter-site reliability of the EBP is poor. Although the EBP's test-retest reliability was satisfactory between the 30 trials (across the 3 heights of release) these findings could be misleading considering the large variation values of the typical percentage error (%CV) found in the analysis. Although EBP devices are developed primarily for circumventing the potential bias of the judges and not for laboratory testing, further research is required in testing the reliability of a variety of body protectors used in official competitions today so as to assure fairness among contestants.

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LONG JUMP

E-Pos. 4.1

Biomechanical analysis of the final strides of the approach and the take-off by visually impaired class f12 and f13 long jumpers

Vassilios Panoutsakopoulos¹, Apostolos Theodorou², Mariana C. Kotzamanidou³, Emmanouil Skordilis² & Iraklis A. Kollias¹

1 Aristotle University of Thessaloniki – TEFAA

2 Kapodistrian University of Athens – TEFAA

3 AKMI Metropolitan College Thessaloniki

Introduction: Long jump is an event of the Paralympic Games where visually impaired jumpers are eligible to compete under three classes (F11: no vision; F12: visual acuity 2/60; F13: visual acuity 6/60). Nevertheless, despite of the lesser visual acuity, European Records in long jumping are greater in class F12 than class F13 both in males and females. The aim of the present study was to compare the biomechanical parameters of the final strides of the approach and the take-off in class F12 and F13 long jumpers.

Material and Methods: 19 class F12 (males: 13, females: 6) and 12 class F13 (males: 4, females: 8) long jumpers participating in the 2009 International Blind Sports Association

European Championships were recorded using a stationary Casio EX-FX1 (Casio Computer Co. Ltd, Shibuya, Japan) digital video camera (sampling frequency: 300fps). Twenty-two anatomical points of the body were manually digitized in each field using a custom made analysis software (©Iraklis A. Kollias) in order to extract key biomechanical parameters.

Results: Official distance was $6.07\text{m} \pm 0.55$ and $5.52\text{m} \pm 0.91$ for F12 and F13 respectively. Independent samples t-test revealed that differences ($p < .05$) occurred between groups concerning the vertical take-off velocity (F12: 2.8m/sec, F13: 2.4m/sec), the support leg's knee flexion-knee joint flexion velocity at the take-off board (F12: 18.2deg-7.4rad/sec, F13: 25.2deg-10.2rad/sec) and the knee maximum flexion angle at the last stride (F12: 116.8deg, F13: 125.4deg). No other statistical significant difference was observed between the groups.

Conclusions: Results indicated that F12 performed better than F13 because of the more advantageous utilization of the factors defining the vertical component in the long-jump take-off, which has been suggested to be the discriminating factor for performance (Panoutsakopoulos et al., 2007). Additionally, the different last stride maximum knee flexion angle might imply differences concerning the mechanics of the placement of the take-off leg. It is possible that factors such as the size and surface properties of the 1.22m x 1.00m chalked take-off area used in F12 competition may contribute to the differences observed in the study.

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E-Pos. 4.2

Colour contrast and regulation of the long jump approach run

Apostolos Theodorou¹, Emmanouela Loakimidou¹, Panagiotis Kouris¹, Vassilios Panoutsakopoulos² & Emmanouil Smpokos³

1 University of Athens – TEFAA

2 University of Thessalonika – TEFAA

3 Hellenic Army Academy

Introduction: Research has shown that visual perception of the take-off board and subsequent regulation of the approach run occurs 4-5 strides prior to take-off. A prerequisite of perception by the human eye is the ability to assess visual contrast between adjacent surfaces and calculate

distances. In visual perception, contrast is determined by the difference in colour and occurs when a surface of one colour induces its antagonist colour in an adjoining surface. The aim of the present study was to investigate if colour contrast between the track surface and the board affects the stride regulation pattern at the long jump approach run.

Material and Methods: Using a runway track coloured blue four long jumpers performed 6 long jumps from a white take-off board and 6 from a modified yellow board on two different occasions. Runway was marked and the approach runs were recorded with a panning camera. Toe-board distance (TBD) for each support phase in every run-up and percentage distribution of adjustment of the regulated strides was calculated according to Hay and Koh (1988). The mean and the standard deviation (SD) of the TBD for each support phase of an athlete's foot on the ground across all trials were calculated. The SD of the mean TBD reflected the variability in foot placement for a particular stride and its maximum value was defined as the footfall where stride regulation appeared.

Results: With the white take-off board the average TBD variability reached its peak value (21.74cm) on the 6th support phase (i.e 5th stride from the board) at a distance of 9.77m from take-off point. With the yellow take-off board the average TBD variability culminated (24.80cm) on the 8th support phase (i.e 7th stride from the board) at a distance of 13.40m from take-off point. With the white board 80% of adjustment was distributed during the last two strides as opposed to 61% with the yellow board.

Conclusions: When a take-off board of a colour complementary to the runway's blue track surface is used athletes initiate their regulation 2 strides earlier. This may be attributed to an enhanced visual perception of the approaching target. This results to a more uniform distribution of adjustments during the last two strides of the approach allowing the athlete to focus on high speed attainment and proper take-off mechanics.

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SKATING

E-Pos. 5.1

Body composition and somatotype of elite skaters

Carmen Manchado¹, Carmen Ferragut², J.ArturoAbralde³ & Helena Vila⁴

1 University of Alicante, Alicante, Spain

2 University of Alcalá de Henares, Madrid, Spain

3 University of Murcia, Murcia, Spain

4 University of Vigo, Pontevedra, Spain

Introduction

Although anthropometric profiles of Olympic athletes as a group are well known, there is still a need for specific reference values for each sport. Each sport presents special and specific characteristics of that discipline in particular. This research has been designed considering the limited number of anthropometric characteristics studies that exist on skating and more specifically on the modality of figures. We pursue two objectives, first of all, define the anthropometric profile, body composition and somatotype of figure roller skater in both sexes in order to establish specific profiles. Secondly, establish the anthropometric differences of body composition and somatotype between both sexes.

Material and Methods

Twenty-seven professional roller skater, all of them participating in the 51th Figure Roller Skating World Championship (male = 13, female =14) underwent measurements of standard anthropometry (height, body mass, arm span, 10 skinfolds, 3 breadths and 11 girths). Somatotype was calculated by Heath-Carter method. T-Student for independent samples was used in order to assess the differences between male and female. Statistical significant differences were registered between male and female in body mass, height, arm span, sum of four and six skinfolds, all the skinfolds studied, and in the upper thigh girth.

Results

The Body Mass Index (BMI) for male skaters was 21.37 ± 1.63 and 21.45 ± 2.35 for female skaters. The results indicate that the arm span is an important feature for the skaters of both sexes. Mesomorphy is the most important component followed by endomorphy. Male skaters present an endo-mesomorphs somatotype (3.55-4.50-2.51). Female skaters present a balanced mesomorphs somatotype (3.27-4.12-2.93).

Conclusions

To have databases with specific anthropometric references corresponding to the elite of a sport, can represent a very useful tool for professional skating, both for the control of training and orientation in the detection of talent.

OTHER SPORTS

RACKET

E-Pos. 6.1

Performance analysis through the use of temporal activity patterns of elite players in beach tennis

José Antonio Pérez Turpín, David Grau Jordá & Diego Santos Bailón

University of Alicante, Spain

In order to identify the real components of beach tennis performance, we need to know the time structure of the competition. This study was designed to identify the distribution of time in real and absolute play during the matches, sets and points played by professional beach tennis players. To do so, we made video recordings of 12 players playing four matches at the Spain Beach Tennis Championships (Barcelona 2009). We measured the total length of the matches, sets, games and points while differentiating real playing time. We observed that the absolute time per match was 38min 2sec±24min 4.1sec, while real playing time was 8min 49.75sec±4min 51.16sec. The average length of the total duration of the sets was 15min 36.25sec±8min 21.9sec and real playing time was 4min 24.86sec±2min 26.41sec. The average length of the total duration of the games was 1min 42.6sec±1min 3.45sec and real playing time was 29.03sec±16.99sec. The average time taken to play a point was 4.56sec±2.99sec. An improved understanding of absolute and real playing time provides valuable information that allows us to create specific training patterns for beach tennis.

ROWING

E-Pos. 7.1

Comparative analysis of the olympic rowing and Mediterranean rowing fixed seat: a sociological study

Alfonso Penichet Tomás & José Manuel Jiménez Olmedo

University of Alicante, Spain

Introduction: Rowing can call those sports that use a boat propelled by one or more rowers placed back to the direction of travel. We can classify fixed seat rowing, where the rowers seat rowing is static and mobile bank where the seat moves inland. The aim of this study was to determine and compare age, experience and training frequency (hours and days per week) in rowing mobile bank and bank fixed the Mediterranean.

Material and Method: A questionnaire was provided to 79 rowers men with a mean age of 27.66 ± 7.15 belonging to the male in the senior category VIII Rowing Championship of Spain's Mediterranean Bank Fixed that took place in Torrevieja during the 25th, 26th and 27th of May.

Results: Fixed seat rowers Mediterranean have a mean age 27.66 ± 9.69 years and have an average experience of 9.00 ± 6.97 years. Train half of 5.26 ± 1.41 days per week and 2.14 ± 0.49 hours per week.

Conclusions: The average age is higher in fixed bank in mobile banking. We found significant differences between fixed seat rowing performance, years of experience and training days a week, the more years of experience and more training days a week best performance is obtained. Mobile bank rowers train twice weekly hours.

E-Pos. 7.2

Relationship between jump heigth and results in school rowers (14-17 years old)

Manuel Castillo Gómez, Ruben Jover Escolano & Alfonso Penichet Tomás

University of Alicante, Spain

Introduction: Rowing power was significantly related to leg extension strength (Jensen et al., 1995). Rowing involves almost every muscle in the body and bilateral leg extension power is very important during this activity. (Yoshiga et al, 2003).

The aim of this study is to establish the relationship between the vertical jump height and the results in rowing with mobile seat in school rowers (14-17 years old).

Material and Method: The study was performed with 22 male rowers, who participated in rowing with mobile seat in two categories (young and junior) at the I Regata Promoción Banco Móvil, in Alicante, the 15th of January 2011. They were tested to determine their jump power (squat jump and countermovement continuous jump).

Results: In both categories, after relating the regatta ranking and the jump height, we see a descending tendency, which means that the higher the jump is the better results in the classification. **Conclusions:** Although there is a tendency relating the higher jump with better results in the classification, no significant difference has been observed. It can be due to the interaction of other muscle groups in rowing.

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E-Pos. 7.3

Emotional intelligence and Mediterranean fixed bench rowing

Maria Magdalena Pérez Martínez, Alfonso Penichet Tomás, Ainara Motera Pastor & Ainhoa Rodríguez Porta

University of Alicante, Spain

The main objective of the present study is to find out the similarities between different aspects of the emotional intelligence and the physical performance in the rowing fixed bench sport. The research subjects were 70 athletes belonging to the Suma League of Mediterranean Fixed bench Rowing. The instrumentation was the EQ-i Baron test (1997), the TMMS-24 questionnaire on emotional attention, clarity and repair emotional feelings (Fernández-Berrocal et al., 2004) and ego/task orientation questionnaire in Sport, TEOSQ (Balaguer et al., 1996). Data analysis was performed with statistical analysis software SPSS v18 for the Person correlation between the variables studied. The results concluded that years of competition correlate positively

significantly with performance in competition. In addition, no significant differences between the performance level and the level of clarity and emotional care, however, there is a statistically positive correlation between performance and the level of emotional repair. When the performance is better higher the level of repair. Finally, this study shows that there is a statistically positive correlation between performance and task orientation. A higher performance and a greater task orientation reduced performance at higher ego orientation.

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RHYTHMIC GYMNASTICS

E-Pos. 8.1

Flexibility, strength and technical aspects of the split jump in rhythmic gymnastics

Martine Verheul¹, Wendy Timmons¹ and Belia Mendez-Rial²

1 Institute for Sport, Physical Education and Health Sciences, The University of Edinburgh (Edinburgh, UK)

2 University of Vigo (Vigo, Spain)

Leaps and jumps are fundamental elements of rhythmic gymnastics and the quality of their performance has a critical influence on the sport outcomes (Miletic et al, 2004). Previous research has shown that technical performance strongly depends on physical condition (e.g., Di Cagno et al, 2009). However, these studies did not include a detailed, quantitative analysis of technique. Flexibility (sit and reach), static core strength (Kendall et al., 1993) and explosive strength (semi-squad (SS) and countermovement (CM) jump) were measured in twelve competitive (national-level) female rhythmic gymnasts (aged 12.17 (+/-1.59) years). The gymnasts performed the split jump once with the left leg forward (SJ-L) and once with the right leg forward (SJ-R). Technical aspects of their performance were analysed using Qualysis3D motion analysis. Three qualified judges also assessed routine involving jumps, rotation and

balances that were set according to the Code of Points 2013-2016. For both split jumps a significantly smaller maximum angle for the forward leg than for the back leg was found (SJ-L $t=2.73$, $p=.02$; SJ-R $z=-2.51$, $p=.01$). On average, the forward leg reached a maximum angle of 56.9 degrees (SJ-L) and 55.9 degrees (SJ-R), whereas the back leg reached maximum angles of 72.6 degrees (SJ-L) and 81.0 degrees (SJ-R). Neither flexibility nor explosive strength was significantly correlated with the technique of the split jump. Static core strength, however, was negatively correlated with the asymmetry between the maximum angles of the two legs (SJ-L $r=-.71$, $p=.01$; SJ-R $r=-.68$, $p=.02$), indicating that less core strength was associated with a larger asymmetry between the legs in the performance of the split jump. Positive correlations were found between the judges' scores for the gymnasts' routine and the explosive strength tests (SS $r=.76$, $p=.00$; CM $r=.81$, $p=.00$) and maximum angle of the split in the split jump (SJ-L $r=.68$, $p=.02$; SJ-R $r=.60$, $p=.04$). This study enhances our understanding of the physical condition of rhythmic gymnasts and its relationship with technique and over all performance. The knowledge gained in this research will contribute to the improvement of training protocols in order to further enhance gymnasts' performance.

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E-Pos. 8.2

Determinants of competitive performance in rhythmic gymnastics. A review

Marta Bobo Arce¹ & Belia Mendez Rial²

1 University of A Coruña (Spain)

2 University of Vigo (Spain)

Rhythmic Gymnastics is as a complex artistic sport with a particular training process (young athletes, many repetitions, great volume of hours, ..). To identify the predictors of a competitive

performance would permit talent identification and improve and optimize the training process to obtain higher results in competition. In this context, based on a critical examination of the literature about “Rhythmic Gymnastics” and “Performance”, the aim of this research was to identify the factors that have been studied to predict a higher performance in Rhythmic Gymnastics, analyze them and determinate an "effectively training proposal" to achieve the higher results in competitions. We divided the references in different groups: a) Physiological and biological condition; b) Technical aspects; c) Psychological factors; d) Training protocols, e) Other factors and f) Performance analysis. The results show most studies on rhythmic gymnastics are descriptive studies about a topic, fewer studies have examined one or more variables related with the performance and more scarce are the studies that show a global perspective and try to explain the predictor of the level of performance (e.g., Avila-Carvalho et al., 2012; Hume et al, 1993; Perl, 2004; Rutkauskaita and Skarbalius, 2012). In conclusion, we found some predictors of a competitive performance in Rhythmic Gymnastics which define our proposal. Further intervention studies on the way of the Metamodel studies: “The theoretical and interaction of training and sport performance” would permit identify the contribution of each factor to the performance and would explain our model on a proper and scientifically way.

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E-Pos. 8.3**Apparatus handling in elite individual rhythmic gymnastics**

Marta Bobo-Arce¹, Elena Sierra-Palmeiro¹ & M^a Ángeles Fernandez-Villarino²

1 University of A Coruña, (Spain)

2 University of Vigo (Spain)

Small apparatus technique is a specific part of rhythmic gymnastics (RG) performance, along with body technique and artistic parameters. Few studies are related to individual performance compare to the group modality. The aim of this study was to analyze the RG apparatus handling performed by the best gymnast in the world to quantify the apparatus technical elements executed throughout four Olympic cycles and to identify if there are relations with the competition final classification. The sample consisted of 224 individual exercises from the Final Competitions of 1997 European Championships and 2001, 2003, 2005, 2007, 2009, 2011 World Championships. Data was collected through video analysis of gymnast's routines done by expert judges using a specific category system. Results show that in all apparatus, but ribbon, there is an increase in the amount of handlings performed by the gymnast. Significant differences were obtained in all apparatus when comparing the seven competitions. However post-hoc analysis informed that these differences vary and cluster into two or three groups depending on the apparatus and the years of the competition analyzed. Correlation analysis did not show associations between apparatus handling and classification in competition, but for rope in 2009 ($r = -0.04$; $p = 0.002$) and ball in 2005 ($r = 0.916$; $p = 0.001$). These results suggest that even though the duration of the exercises is stable overtime (1 minute and 30 seconds) the increase/decrease in the apparatus handling may be affected by the rules and the specific motor patterns and nature of each apparatus. To predict how much they contribute to final classification they have to be studied along another variables like body technique and artistic performance demands.

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SAILING

E-Pos. 9.1

The profile of elite national dinghy: Spanish Optimist Cup 2012. An educational approach

María del Mar Silvestre García & Sheila Saiz Colomina

University of Alicante, Spain

This study was conducted during the Spain Cup sailing in the Optimist class at the Yacht Club Costa Blanca Alicante (Spain) in 2012.

The aim of the study was to determine the performance profile of elite sailors Optimist class by studying different performance indicators. We 86 participants, thus Royal Spanish Sailing Federation as established professionals. The data were collected by different validated instruments during the days before the competition. The quantitative data analysis was analyzed with SPSS software v.19, Student's t test and Pearson correlations to see whether there were significant differences between girls and boys, and the group of low performance and high performance regarding to the determined variables that defined “performance profile.” It was established that there was significant differences between the strength of the girls and boys and between the strength of the high-and low-performing ($p \leq .05$). All these data provide relevant information as profile indicators professional sailor.

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ATHLETICS

E-Pos. 10.1

Effects of randomization versus preorientation of subjects for the prediction of maximum oxygen uptake using the twelve minutes run test (12-MRT)

Peguy Brice Assomo Ndemba¹, Samuel Honoré Mandengue¹, Wiliam Richard Guessogo² & Laurent Serge Etoundi Ngoa³

1 Exercise and Sport Physiology Unit, Faculty of Science, University of Douala, Cameroon

2 National Institute for Youth and Sports, Yaounde, Cameroon

3 Higher Teacher Training College, Yaounde, Cameroon

Background/Aim: In studies interested in the reliability and validity of field tests with participants running in group, the constitution of groups is always randomized; whereas subjects constituting a given group may have similar or different performance. In this study, we hypothesized that running in a group is a leading contributor to the improvement of maximum oxygen uptake (VO₂max) and investigated the effects of pre-orientated group versus randomized during the twelve minute run test (12 – MRT).

Methods: Thirty three athletes performed the 12-MRT in four variants (V): In V1, each subject ran alone (Alone). In V2, subjects performed the test on the same track as in V1 but in randomized groups of three (Group). In V3, subjects performed the test in preoriented group (PO-Group) of three i.e, subjects were grouped into high, intermediate and low performances according to the results obtained in V1. In V4, subjects ran alone but on a 200m athletic track (Half-Track). V2, V3 and V4 were performed randomly. VO₂max was predicted from the

distance covered at the end of the twelve min period by substituting the distance covered in the Cooper regression equation. At the end of each test, the rate of perceived exertion was determined.

Results: No significant difference ($p>0.05$) was found in predicted VO₂max between tests. RPE was significantly higher ($p<0.05$) during PO-Group compared to Alone. Underperforming athletes elicited an underestimation of predicted VO₂max in Alone more important to PO-Group (12.1%) compared to Group (8%). No change of predicted VO₂max was observed in the middle athletes between Alone, Group and PO-Group. For the fastest athletes, predicted VO₂max was significantly lower ($p<0.05$) for PO-Group compared to Alone where as for the Group, predicted VO₂max was higher ($p<0.05$) compared to Alone.

Conclusion: These results suggest that prediction of VO₂max using the 12-MRT is influenced by peer relationship and the training status of athletes.

VALENCIAN BALL

E-Pos. 11.1

Height, weight, body mass index, age and professional years in valencian ball players in relation to position

José Antonio Martínez Carbonell & Norberto Pascual Verdú

University of Alicante, Spain

The valencian ball, is a traditional sport of handball in the Valencian Community (Spain), is composed of a set of forms among which we high light the modality of *Escala i Corda (Stand and rope)*, professional modality in which we based this study. The aim of this study tried to find out the height, weight, Body Mass Index (BMI), age and professional years of peak performance professionals valencian ball players with regard to their game line.

Methods. The men's pairs that classified in the *Professional League and Coupe of Stand and Rope* during sea sons 2008-2011 were analyzed. A descriptive, correlational, and longitudinal design was used. The variables studied were: height, weight, age, BMI, professional years, and player role (first, second or third game line).The data were obtained from the web page of the Professional players of *Escala i Corda*.

Results. The average characteristics were 1.76 m, 76.56 kg, a BMI of 24.53, and an age range of

30.83 years.

Conclusions. Players of the game 3th line are younger than the other lines. Players of the game 2nd line, are heavier, taller and with a slighting crease of BMI index in the 1st and 3th game lines. In the 1st and 3th game lines, players are similar in weight, height and BMI. Players of the game 3th line are those with fewer years as professional players.

PYSICAL ACTIVITY AND HEALTH

E-Pos. 12.1

The examination of physical education performance with relation to the social background and nutrition

Margit Borkovits & Attila Szabó

University of Szeged

Introduction

The success of students at school is influenced by how their education is attained. Family, media may all have large contributions to it. Besides the influence of family education may and should they are important role. The sports equipments of a school highly influence the effectiveness of education.

Objectives

We study the following issues of reasons.

The quality of nutrition determines whether physical/mental performance of the students?

The sport performance influences the parents' level of education?

Methods

In this survey paper-and pencil questionnaire was used. The survey concerning eating habits contained various types of question. The data about the physical condition of the students have been collected.

Results and Conclusions

The educational level of the parents is in related to the children's performance in school and to their social status. Children coming from good conditions can take part in non-formal learning activities, while the others can't afford to pay extra for sport activities. Family isn't a role model for the children concerning healthy lifestyle. It is an actual and important task for teachers to

make the students interested in doing sports, and to have the need for regular sporting activity. With the activities adjusted to the given age groups within the compulsory morning P.E. classes as well as the afternoon free time activities might offer several opportunities to help people and students to get rid of their problems and become aware of what exercises they could do to help themselves.

E-Pos. 12.2

Sports, health and flow

Attila Szabó & Margit Borkovits

University of Szeged Faculti of Arts

In our study we compared the psychological immune competence values of two groups. The participants are former kayak-canoe competitors, and teachers who don't do any sports. 50 former competitors and 50 teachers participated in our study. The participants filled four questionnaires.

The questions may be relevant for them.

1. Valid outcome can be gained only in the state of flow.
2. Each successful professional has already experienced flow.
3. This psychological immune system strengthened by trainings and competitions will support the individuals life and career.

Methods Measures

In this survey paper-and pencil questionnaire was used. To gain data in relation to psychological immune competence the Questionnaire of Psychological Immune-system, PIK (Oláh, 1996) was used. The 16 scales attempt to identify the interviewees' stress resistance. Each scale has 5 items and the participants can indicate to what extent they think.

First examination: with PIK questionnaire. Compare the personalities of sportsmen and pedagogues.

Examined group: ex-selected kayak-canoe sportsmen

Control group: pedagogues who don't do any sport

Second examination: with Flow questionnaire. Measuring the flow experience of the men selected team of kayak-canoe. (In 2001, three times: in summer, in autumn and in winter)

Examined group: my adult canoe team

Control group: adult selected canoe team members

Third examination: Making an interview. The description of flow experience by kayak-canoe competitor.

Results and implications

In case of educators there is a significant difference between the feeling of coherence and the strict rules of sports. Sports do not support sportsmen/women in the third dimension of education, namely to acquire skills enabling them to act autonomously. Actually, rules will control their life (Gombócz, 2007). Bearing this fact in our mind indicate that we should develop the educative and pedagogic strategy of trainings. It is also crucial to make a plan that focuses on enhancing the awareness of the importance of experiencing FLOW as well positive thinking.