

SOCCER FIT-FACTS

JULY 15, 2010

SECOND WORLD CONFERENCE ON SCIENCE AND SOCCER

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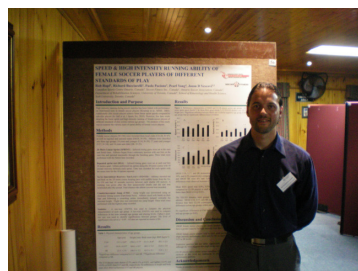


On June 8-9, 2010, in Port Elizabeth, South Africa, Richard Bucciarelli attended and presented at the Second World Conference on Science and Soccer. This event is aimed at individuals who have a specific interest in the scientific study and/or the practical performance of soccer players at either grass roots or the elite professional level. These include academics, full/part-time coaches, strength and conditioning specialists, physiotherapists, and sports medics. The Conference consisted of seminars, presentations, and workshops covering a wide variety of topics, including youth training and talent identification, sport nutrition, coordination and performance mechanics, testing and evaluation of players, and injury prevention.

Our Presentation: Speed and High Intensity Running Ability in Canadian Female Soccer Players:

Our Research:

Speed, repeated sprint capacity, high intensity work capacity, have all been shown to be important predictors of performance in soccer, in both the male and female game. In Canada, there are over 400,000 female soccer players playing at various different age groups, and levels of play in soccer. To date, there has been no study that examined speed and high intensity running abilities — and specifically the differences in these abilities — between female soccer players at different age groups and levels of play in Canada. Our study was conducted to examine speed and high intensity



running ability in female soccer players. We conducted fitness tests on over 100 female players, at three different age groups (U14, U17 and 18+). The players were further categorized into two different levels of play, either low or high, for each age group. Low level players consisted of club and academy players for U14 and U17, and Canadian college players for 18+. High level players consisted of Ontario Provincial Team players for U14, and Canadian National Team players for U17 and 18+. In the study we compared fitness test scores for players of different ages, and levels of ability. The test protocol used was designed by Dr. Jason Vescovi, and Mr. Robert Rupf, of the Canadian Sport Centre of Ontario, and consists of the following tests:

- 20 metre linear sprint test (speed)
- Counter movement Jump test (power)
- 10 x 20 metre sprint test (speed endurance)
- Yo-Yo Intermittent Recovery Test Level 1 (high intensity running capacity)

Our Findings:

Certain findings in our study were somewhat “predictable”. Higher level players were faster (20m sprint), had greater speed endurance (10x20m sprint test) and had better capacity for high intensity work (Yo-Yo test), than lower level players in the same age category.



There are two possible explanations for this finding:

1. Female players playing at higher levels (Provincial and National teams) are receiving better physical training, combined with more physically demanding competition, and thus are showing greater improvements in physical fitness, or;
2. Provincial and National team coaches are selecting players who are bigger, stronger, faster, and more athletic.

While we suspect that both proposed explanations are true, more research into this topic is required before any definite conclusions can be made.

A second, less “predictable” finding from our study was that, among lower level female players, speed, speed endurance and high intensity work capacity levels peaked at the U14 age group (in higher level players there were improvements from U14-U17).

This finding is important, because it suggests that female players who are not participating in Provincial and National Teams — a large proportion of the overall population of female players in Ontario — are not receiving adequate physical training to stimulate improvements in speed, speed endurance, and high intensity work capacity.

**LEARN ABOUT IN
THIS ISSUE:**

- Speed and Speed Endurance in Female Soccer Players
- Optimal Training Load in Soccer
- “Reactive Agility” Training
- Predicting Performance in Soccer
- New and Improved Soccer Fitness Inc!

OUR POSTER PRESENTATION:

SPEED & HIGH INTENSITY RUNNING ABILITY OF FEMALE SOCCER PLAYERS OF DIFFERENT STANDARDS OF PLAY

Rob Rupf¹, Richard Bucciarelli², Paolo Pacione³, Pearl Yang⁴, Jason D Vescovi^{1,5}Canadian Sports Centre Ontario, Canada¹, Soccer Fitness Inc., Canada², Ontario Soccer Association, Canada³, Department of Rehabilitation Sciences, University of Toronto, Canada⁴, School of Kinesiology and Health Science, York University, Toronto, Canada⁵

Introduction and Purpose

High intensity running during soccer matches has been linked with performance on field-based tests in female soccer players (Krustrup et al., MSSE, 2005). Additionally elite soccer players achieve faster linear sprint speeds compared to sub-elite players (le Gall et al, J Sports Sci, 2010). However, few data exists detailing the linear sprint and high intensity running of female soccer players of different standards of play across various age groups. The purpose of this study was to examine the various types of sprint ability of female soccer players.

Methods

Female soccer players (N=106) were recruited from local clubs (CLUB, N=47), as well as regional and national teams (HIGH, N=59). Athletes were classified into three age groups: 14 years and younger (U14, N=39), 17 years and younger (U17, N=34), and 18 years and older (SR, N=33).

20 Metre Linear Sprint (SPRINT) – Infrared timing gates were set at the start and finish lines. Athletes began from a stationary position with one foot on the start line and sprinted maximally through the finishing gates. Three trials were performed with the fastest time recorded.

Repeated sprint test (RSA) – Infrared timing gates were set at each end line 20 metres apart. Athlete performed ten sprints along the 20 metre course with 10 second recovery between each sprint. Time was recorded for each sprint with the mean time for the 10 sprints reported.

Yo-Yo Intermittent Recovery Test-Level 1 (YO-YO) – Athletes traveled out and back on the 20 metre course keeping pace with audible beeps from the Yo-Yo CD and had 10 seconds recovery between each shuttle (40 metres). A warning was given after the first unsuccessful shuttle and the test was terminated after the second. Total distance the athlete covered was recorded.

Countermovement Jump (CMJ) – Jump height was determined using an electronic timing system (OptoJump Next). Athletes stood with hands on their hips and following a crouching action immediately jumped vertically for maximal height. Flight time was converted into jump height. Three trials were performed with the highest jump recorded.

Statistics – A one-way ANOVA was used to compare the physical characteristics of each age group. A two-way ANOVA was used to compare differences in the tests amongst age groups and playing levels. Turkey's post-hoc test was used to identify significances between groups. The level of significance was set to $p < 0.05$. All data are reported as means $\pm$ SD.

Results

Table 1. Physical characteristics of age groups.

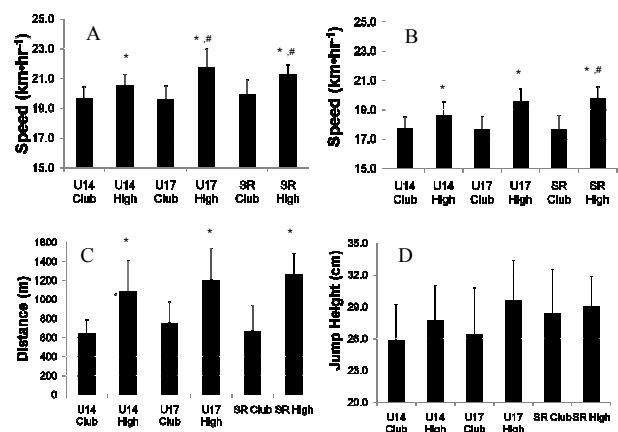
	Age (yrs)	Height (cm)	Body mass (kg)	BMI (kg·m ⁻²)
U14	13.3 $\pm$ 0.6*	159.6 $\pm$ 7.7*	51.5 $\pm$ 8.4*	20.1 $\pm$ 2.3
U17	16.8 $\pm$ 0.5**	164.1 $\pm$ 6.2	60.2 $\pm$ 5.4	22.4 $\pm$ 2.0
SR	22.5 $\pm$ 2.9	166.5 $\pm$ 7.2	63.5 $\pm$ 9.1	22.8 $\pm$ 2.3

*Significant difference compared to U17 and SR. **Significant difference compared to SR.

The U14 players were shorter (2.7% and 4.1%, $p < 0.05$) and lighter (14.5% and 18.9%, $p < 0.05$) than U17 and SR, respectively. No differences in height and body mass were observed between U17 and SR players.

Results

Figure 1. Performance characteristics of HIGH and CLUB players across age groups. A) 20 metre sprint speed (km·hr⁻¹). B) Mean RSA speed (km·hr⁻¹). C) YO-YO distance (m). D) CMJ height (cm). *Significant difference from HIGH and CLUB for respective age group, # HIGH age groups that are significantly different from U14 HIGH.



HIGH U14, U17, and SR demonstrated greater 20 metre sprint speed (4.4%, 10%, and 6.2% respectively) compared to their CLUB counterparts. HIGH U17 and HIGH SR were 6% and 3.4% faster than HIGH U14 ($p < 0.05$). No differences were observed between U17 and SR age groups.

Mean RSA speed was 6.9%, 9.5%, and 10.7% greater in HIGH athletes compared to CLUB players in each age group ($p < 0.05$). HIGH SR were 3.7% faster than HIGH U14 ($p < 0.05$).

The YO-YO distance were greater in HIGH athletes compared to CLUB athletes. HIGH U14, U17, and SR covered 40.8%, 37.5%, and 46.9% greater distance than their CLUB counterparts ($p < 0.05$). There were no significant differences across age groups within each standard of play.

No significant differences in CMJ height were observed between levels of play and age groups ($p > 0.05$).

Discussion and Conclusions

HIGH female soccer players are faster, possess greater speed endurance and have a greater capacity for high intensity work than CLUB players.

HIGH female soccer players tend to show peak performance in sprint speed. High intensity performance (RSA and Yo-Yo) is improved slightly from HIGH U17 to SR levels.

Explosive qualities did not differ significantly between HIGH and CLUB although the trend suggests this might be the case.

CLUB players have similar scores regardless of age group suggesting training methods at this level are inadequate to stimulate improvements in these performance qualities.

Acknowledgements

Thanks is extended to the teams and coaches for participating in this study.

SECOND WORLD CONFERENCE ON SCIENCE AND SOCCER: IMPLICATIONS/RECOMMENDATIONS FOR COACHES:

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General Implications / Recommendations for Youth Coaches in Canada:

Fitness testing is important for female soccer players at different ages (beyond age 13) and levels of play. Tests selected should be valid for measuring the components of fitness which have been shown to be important for soccer, including linear speed, speed endurance, power, and high intensity work capacity. The soccer-specific testing protocol developed by Jason Vescovi and Robert Rupf of the Canadian Sport Centre of Ontario, which includes the 20 metre linear sprint, 10 x 20 metre repeated sprint test, counter-movement jump test, and

Yo-Yo Intermittent Recovery test, Level 1, contains tests which have been proven to be highly correlated with physical performance on the field, in both male and female soccer players. This protocol has been, and continues to be, validated in studies conducted by the CSCO, using female soccer players at different levels of play, including Canadian and US college, and North American Professional players. **Female players should be assessed a minimum of 3 times per year, to evaluate the effectiveness of training interventions and make adjustments and corrections where needed.**

Specific Coaching Recommendations:

Coaches of female players at higher levels of play (Provincial and National) should re-evaluate their selection process, to determine whether they are showing any bias towards players who are more physically and physiologically developed, especially in the younger (U14-U17) age categories.

Coaches of female players at lower levels of play (club, academy, and college) should re-evaluate their fitness training programs, to ensure that the players are receiving optimal training to elicit gains in speed, speed endurance, and high intensity work capacity.

“Coaches of female players at high levels of play should re-evaluate their selection process...coaches of female players at low levels of play should re-evaluate their fitness training programs ”

SECOND WORLD CONFERENCE ON SCIENCE AND SOCCER: SUMMARY OF RELEVANT SPEECHES AND PRESENTATIONS: (CONT. ON PAGE 4)

Dr. Barry Drust

Reader, Applied Physiology,

Liverpool John Moores University,

Liverpool, England:

Dr Drust gave a Keynote speech, titled “Contemporary Approaches to Soccer Training”. Highlights included:

- Training soccer players 2x/day, 3 days per week, may lead to greater physiological benefits than training 1x/day, 6 days per week
- Since it is difficult to control the intensity of small-sided games for each individual athlete, “position-specific” training may be a more effective mode of specific conditioning with the ball
- Players who are not playing regularly or not “match-fit” may benefit from very short duration, very high intensity training, to see great improvements in aerobic fitness in a short amount of time
- Coaches must first identify their team’s specific problem, then research to find the most applicable training solution

Dr. Randy Wilson

Associate Professor, Department of Biology,

The University of Queensland,

Queensland, Australia:

Dr. Wilson gave an oral presentation, titled “What Makes a Great Footballer? Relative Importance of Skill, Athletic Ability and Balance”. Highlights included:

- Overall measure of “skill” using soccer-specific skill tests, was the best predictor of soccer-tennis performance
- Overall athletic ability was unrelated to soccer tennis performance
- The best overall single predictive trait was average static balance, with this trait alone explaining more than 30% of the variation in soccer-tennis score. Static balance training regimes are thus suggested to be an important component of the overall training program in soccer
- By adapting this protocol to the actual sport of soccer, Dr. Wilson’s method has the potential to markedly improve talent identification strategies in professional soccer

Dr. Garreth Patterson

Professor, Sport Science,

Stellenbosch University,

Stellenbosch, South Africa:

Dr Patterson gave an oral presentation, titled “Reactive Agility, Sprint Speed and Change of Direction Speed in Soccer Players”. Highlights included:

- a new Reactive Agility Test (RAT) has been developed, in which the players do not know in advance which direction / running pattern they will travel
- Dr. Patterson’s study compared high level (professional) and intermediate level (university) players in the RAT test, as well as “standard” speed and agility tests
- High level players were faster than intermediate level players in the RAT test, whereas scores were the same for the “standard” speed and agility tests
- The RAT test was found to be able to distinguish high level from intermediate level soccer players, and supports the position that the perceptual aspect of reactive agility may be one factor that discriminates between levels of soccer performance

We are on the Web!
www.soccerfitness.ca

SOCCER FITNESS INC.

24 HARRISON ROAD
 NORTH YORK, ONTARIO
 M2L 1V4

Phone: 647-829-4360

E-mail: richard@soccerfitness.ca

* NEW TO SOCCER FITNESS IN 2010 *

Soccer Fitness Inc. has undergone some exciting new changes in the past few months, and we wanted to take some space in our newsletter to share them with you!

Firstly, our website, www.soccerfitness.ca, has undergone a complete make-over. In addition to providing detailed information about our Services and Programs, we have introduced a Member's Section, free to join, which contains back issues of Soccer Fit-Facts, as well as hundreds more articles, scientific studies, videos of training exercises and sessions, and much more.

Second, we have been, and are still in the process of, re-structuring our testing and training programs. In keeping with our philosophy and position as leaders in the field of soccer-specific sports science, we will be adding some advanced, state-of-the-art equipment, as well as modifying and upgrading our assessment and training protocols, to ensure that all Soccer Fitness-trained athletes receive the most up-to-date soccer-specific strength and conditioning available.

Keep logging on to soccerfitness.ca, to stay abreast of all our exciting new developments in the months that lie ahead!

SWCSS—PRESENTATION HIGHLIGHTS (CON'T FROM PAGE 3)

Dr. Manuel Sillero Quintana

Professor, Physical Education,

Madrid Polytechnic University,

Madrid, Spain:

Dr. Sillero Gave an oral presentation titled "Application of Thermography as Injury Prevention Method in a Professional Soccer Team". Highlights included:

- Modern infrared thermography equipment has made possible very accurate and objective recording of the body surface with a single picture (pictures show areas of the body with increased temperature)
- In an analysis of 23 professional soccer players in Spain, there was a direct relationship between declared "level of nuisance" — pain — and its temperature in both knees and ankles; significant differences were also found in temperatures between "painful" and "non-painful" limbs in the knee and hamstrings
- Infrared thermography may be a valid, fast and convenient method of screening for, and preventing soccer injuries

Dr. Martin Schwellnus,

Professor, Sports and Exercise Medicine,

University of Cape Town,

Cape Town, South Africa:

Dr. Schwellnus gave a keynote speech titled "Environmental Factors and Medical Illness in Football Players During International Tournaments". Highlights included:

- The most common cause of players missing matches at international tournaments is illness, not injury
- The most common system affected by illness in athletes is the respiratory tract
- Possible causes include: "Infective Hypothesis" — respiratory infections; "Allergic Hypothesis" — allergens leading to respiratory symptoms; and "Environmental Hypothesis" — environmental factors leading to increased inflammation in the respiratory tract
- Early recognition / diagnosis and treatment, including allergy testing, asthma and exercise-induced asthma tests, and other medical treatments, are advisable

Dr. Hiroyuki Yasumatsu,

Associate Professor, Sport and Wellness,

Rikkyo University,

Saitama, Japan:

Dr. Yasumatsu gave an oral presentation titled "Effects of Hyperthermia on Soccer Performance". Highlights included:

- A study was done on east Asian players, comparing the effects of heat stress on soccer performance, with players wither wearing shorts/t-shirt ("normal wear"), or jacket/pants ("simulated heat stress") and performing a soccer-specific running protocol and skills tests
- Core body temperature, % of maximum heart rate, and body water loss were all higher in the "heat trial"; sprint and endurance performance, and shooting skills were also lower in the "heat trial"
- Heat stress increases body temperature, water loss and heat retention, and players must be closely monitored, especially when competing in unfamiliarly warm climates