

Issues in training the female player

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On the surface, the women's game appears to be similar to the men's game. On closer examination, there are subtle differences in the nature of how each gender plays the game, which are evident in the disparity between skills, tactics and fitness. The technical weaknesses of women include the first touch, dribbling, long passing and goal keeping. These skill limitations have dictated specific tactical approaches towards both attack and defence. Specific biological limitations inherent in the female player affect the pace and total work output in the women's game. Although it is unrealistic to expect the women's game to approach the work output of the men's game, specific training of skills and fitness will influence the tactical approach to the game.

The football community is aware that the major growth in the game has been, and will continue to be, among female players. In sports where men and women compete using a common set of rules, it is routine to find limitations in the women's game compared with the men's game. Although the female player's actual performance will probably not duplicate that of male players in terms of the various physical aspects and demands of the game, it is instructive to look at the differences to see if there are limitations that could be reduced by training and coaching.

To train an athlete properly, it is important to know the physical demands of the game. There are numerous reports on the time–motion demands of the men's game and dozens of reports on the physiological profiles of various levels of male players. Similar reports for women are not nearly as numerous, or in some cases absent, and must rely on expert opinion of coaches. Most coaches, especially football coaches, consider preparation for the game to be an interaction of fitness (physical and psychological), technique and tactics. This paper will deal with the differences in each aspect, focusing on the physical aspects of the game with specific emphasis on more competitive settings in which fitness can be a factor in the outcome of a match.

THE NATURE OF THE GAME

The men's game

Since the original work by Reilly and Thomas,¹ and Reep and Benjamin² there have been numerous accounts of the time–motion and basic tactical aspects of men's football. Newer data are different mostly in a matter of degree; the basic concepts originally reported remain remarkably constant. More recent work, however, has focused on the higher-intensity aspect of the game that varies according to level of play and is the part of the game most likely to determine the outcome of a match.³ In addition, with more high-intensity running at the highest levels of play, it should not be surprising that the overall intensity of play rises with higher levels of play.

As originally reported by Reep and Benjamin,² the overwhelming majority of possessions in football are brief, and about 80% of all possessions begin and end with three or fewer completed passes per possession. The shots:goal ratio has remained quite constant at about 10:1. Although this may not apply to any one match, when considered over multiple matches, this ratio has remained surprisingly stable. Regarding goals, when shots are taken inside the penalty area, the shot is usually a one-touch shot with few shots being set up

by dribbling. A review of the 1998 Fédération Internationale de Football Association (FIFA) World Cup goals⁴ showed a 1 in 7 chance of scoring when the shot was taken inside the goal area, 1 in 9 when taken inside the penalty area and 1 in 33 when taken outside the penalty area. Narrow-angle goals were rare. Goals in the men's game, when observed over a long season, tend to increase with time in the game,⁵ but at the FIFA World Cup™ they were concentrated in the first and last 15-min periods of the second half.⁴ A typical shooting possession was of four players and three passes or fewer that began in the offensive or middle third of the field. Few shooting possessions began with, or involved, the team's goalkeeper. Square or back passes allow the defence to become more organised and limit the opportunity for a shot. Although Argentina strung 25 consecutive passes leading to a goal against Serbia-Montenegro in the 2006 FIFA World Cup Germany and was a wonderful example of "the beautiful game", such examples are indeed rare.

Reilly's original work suggested that the men's game required about 8.5 km of running with about two-thirds of the running at the low intensities of walking and jogging.¹ He also showed that a player was in possession of the ball for 2 min or less and sprinted about 800 m, mostly in sprints of 10–40 m. Lastly, he showed that there was a change in speed or direction about once every 4–6 s. Since this description of the game, the literature reports the volume of running has climbed to 10–14 km,³ mostly depending on position and importance of the match, but the relative distribution of distance by speed has remained somewhat constant.

The physiological profile of the male player has been reported in a number of studies, many of which appear in the compilations from the six World Congresses on Science and Football. Profile studies suggest the typical professional adult male footballer has a maximum oxygen consumption of 55–65 ml/kg/min, can sprint 20 m at 8.5+m/s, can jump 65 cm from a counter movement jump (one-step approach), and has body fat of 8–12%. Anyone familiar with these values will realise there is nothing exceptional here when compared with the broad spectrum of all athletes. Their agility, on the other hand, is impressive.

The women's game

The reports by Reilly and Reep were on men, mostly professionals, but Reep's work examined various levels of football. Similar time–motion studies on the women's game are limited.⁶ Although reports referencing on women's football

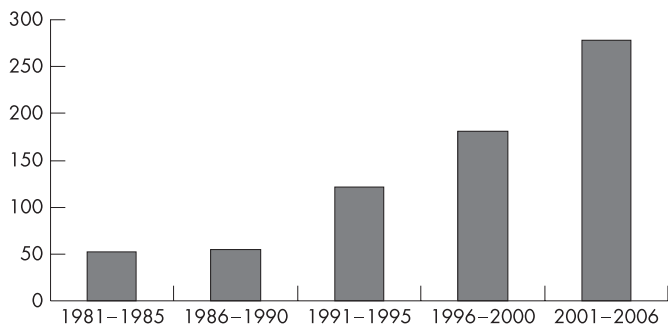


Figure 1 Number of published studies with reference to women's football by year.

have been steadily increasing (fig 1), most of the topics are related to injury with little on actual football performance.

Recently, the prolific group from Copenhagen has reported on women's football. As they did with their work on men's football, the group ventured away from total running distance since most of the distance covered is at the lower intensities of walking and jogging. Their focus is on the high-intensity aspects of the game because games are won or lost on successful attempts on goal carried out at high speed. The group reports^{6,7} parallel data on men showing that the higher the level of play (international v various levels of domestic league) the greater the total, and high intensity, work involved. Whereas reports on males show total running volume of 10–14 km, top class and elite women average 10.3–10.4 km a match. The top class/elite player ran considerably further at high intensity than the moderate level of player (1.7 v 1.3 km, respectively). Similarly, the sprint distance was greater at the higher level of play (0.46 vs 0.38 km). Many of the players studied were observed in both domestic league and international matches. A direct comparison of domestic and international matches showed the volume of running and volume of high-intensity running in an international match (10.0 km and 1.6 km, respectively) were greater than in domestic matches (9.7 km and 1.4 km, respectively). The data were also reported according to 15-min intervals, showing a gradual reduction in total and high-intensity running volume regardless of level of play. This was particularly evident in the second half of the matches. On average, there was a 40% drop in high-intensity running from the first to the final 15 min of play.⁶ This was attributed to interaction between muscle lactate and glycogen depletion and other aspects of physical and mental fatigue.^{6,7}

What is interesting is that there is overlap between male and female players in the running volume and intensity in matches. Women averaged about 10 km whereas averages for men range from 10 km to 14 km. In a game in which men and women play under the same rules and field size, one should appreciate that the female player, with well-known gender-specific limitations to endurance performance, is capable of covering similar running volume.

Reports on tactical aspects of the game are confined to the coaching literature. A limited series of observations on women looked at the round of 16 to the finals of the 1999 FIFA Women's World Cup.⁴ All shooting possessions were evaluated on a variety of descriptive parameters. Such descriptions are but a snapshot of the larger world of women's football as the number of games is limited, and football statisticians such as Neil Lanham⁸ correctly point out that many hundreds of games need to be studied to obtain a truer picture of the woman's game. As with men, about 75–80% of all possessions were of three or fewer passes. An obvious difference was in relation to where possession was obtained. Successful shooting possessions for men began in the offensive and middle thirds of the

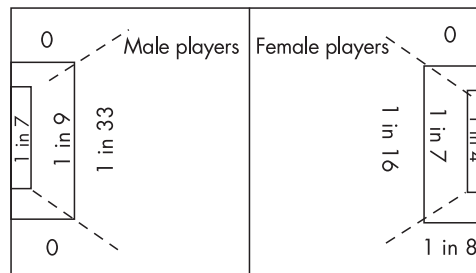


Figure 2 Probability of scoring by shooting location and gender.

field. For women, the possessions began mostly in the offensive third of the field followed by one to two passes to a shot. As the players with the weakest skill tend to be concentrated on the defence, coaches stress aggressive defending by their strikers to force poor skill execution by the opposing defenders, which would lead to a change of possession in a dangerous part of the field (DiCicco, personal communication, 2000). Scoring success was similar in the penalty area, better in the goal area and from outside the penalty area (fig 2). This is probably a statement on the quality of goalkeeping, in commanding the area in front of the goal, or their ability at handling long-range shooting (DiCicco, Dorrance, personal communication 2002). In addition, as there is still a wide disparity among teams in major competitions, the better teams will press the weaker team early in an attempt to score and force the weaker team to play from behind (fig 3).

THE COACH'S VIEW OF THE WOMAN'S GAME

Coaches of the women's game see weaknesses in skill, tactics and fitness that need to be dealt with in training to improve the standard of play. The comments that follow are based on interviews with established coaches in the USA.

Skill

Skill is paramount for success. In the absence of skill, players are unable to execute the coach's vision of how the game should be played. April Heinrichs, past US Women's national team coach, points out three primary weaknesses of the female player.

First is basic skill in all players. Too often, a team has but a few skilled players who play in the middle third of the field and less skilled players play near the touchlines or in defence. Coaches focus training time on tactics, neglecting valuable skill acquisition which needs time and repetition. Probably the weakest skill of the female player is the first touch on the ball. If the ball cannot be skilfully received, either while standing or, more importantly, while moving, it is difficult to continue a

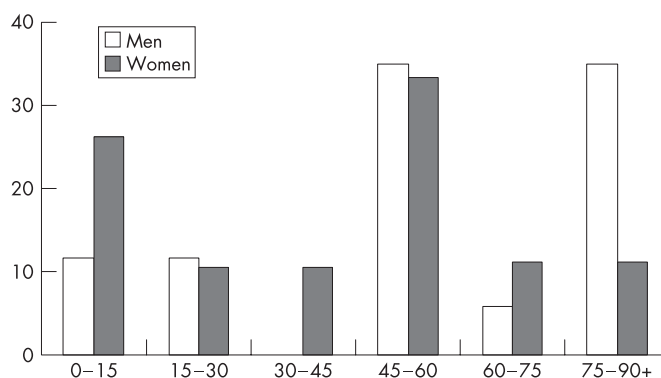


Figure 3 Time of goal by gender: 1998 FIFA World Cup versus 1999 FIFA Women's World Cup.

quality possession. Another weakness is in dribbling, which is one part skill and one part confidence. The “take on artist” is a valued player on any team, male or female. Coaches want players to “wear out the ball” in their attempt to become better dribblers. Second, Heinrichs felt the female player was poorly prepared for a specific skill: delivering and receiving long passes. The team that can accurately serve and skilfully receive a long ball is a dangerous team. Lastly, she felt that goalkeepers need to improve several areas including foot skills, distribution, the ability to handle long-range shots, and improve command of the area in front of the goal.

How one improves skill is related to the coach’s understanding of the skill requirements for the level of play of the team being coached. There are many philosophies and concepts on the best ways to instruct skill that follow basic motor skill acquisition, including concepts of blocked versus distributed practice, practice versus game speed training, as well as the roles of individual, small and large group activities. In football, it is generally felt that the smaller the activity, the more ball contacts and greater improvement in skill. In addition, the play area may be reduced to concentrate players in a smaller area requiring higher quality skill and faster decision making to execute the activity successfully; a competitive activity played in a 10×10 m box is far more difficult than when played in a 20×20 m box.

Some coaches want players to perform skills as perfectly as possible and organise activities that offer constant repetition under ideal circumstances for perfect execution. Others feel that the game offers a multitude of random ball contacts and players must be ready to handle anything that comes their way. These coaches feel that more variable conditions of receipt and delivery of the ball are important to being prepared for the randomness of match play. As such, skill activities are incorporated into controlled small game competitive settings as opposed to highly structured activities.

One aspect of skill acquisition that goes in cycles is the emphasis on juggling. In the 1970s, juggling was a routine part of team and solo training; it went out of fashion for a while but has come back in recent years. Coaches will observe that there are plenty of good jugglers who are poor players, but they know of few accomplished players who cannot juggle, and the accomplished player is one who can control the ball however it arrives, something juggling is thought to help train. In the end, time and repetition are needed to perfect skill performance regardless of the philosophy.

Tactics

Tactically, the female player needs to improve her understanding of the flow of the game. Many women only play the game and have few opportunities to watch and study various nuances of the game. The game they play looks different from the men’s game so men’s games do not have the same attraction to the developing female player as would women’s games. Unfortunately, if a female is to watch a game, she must usually watch it in person since so few games are televised and there are far fewer opportunities to watch higher-level play by women. This may have some cultural influence as observers say

that the Brazilian women have copied some skill and tactical aspects of their male counterparts. That and much of Brazil’s sporting resources are focused on football.

Furthermore, the play of the goalkeeper needs to improve. The team that does not take the time to focus training on the goalkeeper is failing to do its part in developing this aspect of the game. It is generally felt that most coaches in club and scholastic soccer do not train their goalkeepers to the same degree of focus as they do for the field player. The major women’s footballing nations (eg, USA, Germany, Norway, China) seem to be producing high-quality goalkeeping.

The tactical situations described earlier are actively coached. Defenders usually have the weakest skill. Thus, the strikers are taught early in their competitive career to play defence aggressively. They may not obtain possession of the ball, but their pressure forces the poorly skilled defender to make poor decisions or execute skills in such a way that the striker’s teammate picks up a loose ball. Once possession has been obtained, a quick attack is executed with a penetrating run and pass in an area of the field where the defence is most vulnerable. Square and back passes are discouraged since such passes delay the attack giving the defence time to organise. In addition, the better teams know the goalkeeper is not strong in the air or at handling long shots. Thus, teams are taught to attack from the flank delivering passes in the air or take long-range shots in hopes of the goalkeeper mishandling the ball. The best teams generally want up to three players on frame, one at each post and one at the middle of the goal, to pick up poorly handed balls from a cross or a long shot.

As stated earlier, the female player lacks the opportunity to watch matches that might be meaningful to her or to participate in frequent free play setting in parks and back gardens. Without these opportunities, the developing female player misses out on seeing how players relate to each other on the field. It is quite common to see coaches of female teams taking their players through unopposed training (sometimes called shadow training) to teach spacing and team shape, concepts that are learned during free play as youth. Although this can be an effective teaching method, it takes away a considerable part of the time needed to correct and improve skill deficiencies. A team that may have appropriate shape and spacing but cannot control the ball will be at a distinct disadvantage.

Fitness

The most obvious difference between men and women is in general athletic ability and the level of fitness the woman is able to obtain.^{9 10} Men are faster, have more endurance, agility, strength and power. Simply by these biological differences, the female game is played at a slower pace. The general observation is that the adult female game is played at a pace similar to a U16–17 boys’ team. Ajax Amsterdam uses the TIPS philosophy on player selection: technique, intelligence, personality, speed. When female players, like male players, are auditioning for a higher-level team, the physical trait that is of paramount importance is speed. Speed is somewhat inherent—coaches

What is already known on this topic

- On the surface men’s and women’s football appear similar. The bulk of literature is directed at the men’s game, yet inherent physiological traits limiting the work volume and intensity of the female player.

What this study adds

- On the basis of interviews with established coaches in women’s football, the subtle differences of skill and fitness between the men’s and women’s game influence tactical patterns of play for women.

feel that the other factors of fitness can be improved with training to meet the specific demands of the game.

The basic methods of training to improve fitness are beyond the scope of this paper. The typical reader of this journal is familiar with the basic principles of overload and the interactions that go into physical training for a ball game. How this is achieved in football differs between men and women, but not because of physiological differences. Men routinely are put into competitive situations where they will work intensely within the limitations of the activity; the male player likes to compete. For example, a coach could set up teams of four and play a round robin "tourney", in which the final records are posted for each player who could then see where they stand in comparison with their teammates. In the next week, new teams are set and records updated. Over many weeks, the best players (ie, the winners) will be visible through competition. Most coaches of women's teams find that the typical female player is less inclined to compete to the same degree in training. Thus, many coaches will include traditional interval-style track training method emphasising 10–40 m sprints up to longer 100 m runs at a slightly lower pace. This training is time efficient, but may be part of the reason why women have less skill since the ball is not involved and if they spent part of the session in shadow training, considerable time on the ball has been lost.

Another factor that influences eventual levels of fitness is the nature of the annual football calendar. Seasons are not as long as the men's, meaning there is a longer off-season. Except for the most competitive of teams, female players do not prepare extensively for the start of the training camp and a variety of training programmes have been shown to effectively prepare players for the rigors of training camp and season.^{11 12} This means that the coach has a short period of time to physically prepare the team. Then, once the season begins, the match calendar is very dense with two games a week being typical. For ease of scheduling, especially scholastic programmes, games can be scheduled on a Thursday–Saturday or Friday–Sunday routine, which leaves only 1 day to devote to fitness. But the coach is in a quandary. How do they incorporate a fitness day into a week where they know skill work must be planned as well as tactical instruction for upcoming matches? In many cases, the fitness work gives way to skill/tactical sessions. The coach who is willing to commit "Tuesday" to fitness can expect to maintain, or possibly even improve, fitness throughout the season. The coach who commits "Tuesday" to skill and tactics will probably see a decline in fitness because the only high-intensity work will be the match, and only for those who actually play in the match. Of course, if the match schedule is one match a week, the coach needs to plan two fitness "days" during the training week. The issue of match density, performance and injury in men has been discussed elsewhere.¹³ It should be obvious the challenge the coach has in organising a week and a season with respect to known skill deficiencies, fitness enhancement and tactical awareness within a busy match schedule.

GREAT TEAMS ARE MADE WITH GREAT PLAYERS

Although it is unreasonable to expect the women's game to be played at a similar level as the men's game, there are areas in which training will have an impact on performance in football. Too often, coaches try to develop great athletes—players whose physical abilities are impressive. Coaching for athleticism discourages spontaneous creativity necessary to impart one's personality on the game. The outcome of a game is more likely

the result of great players than great athletes. Choose any great player from whatever era—Puskas, Pele, Best, Cryuff, Maradona, Beckenbauer, Zidane, Ronaldinho, Hamm, Sissi, Akers, Prinz, Wen or any number of others. What is a common feature of their game? All are exceptionally skilled with confidence in their ability to control the ball and are willing to assume the risk of taking on an opponent. Yes, they fail on occasion, but when they succeed, the result is spectacular. The reader should not mistake the comments by coaches to mean dribbling is to be prized at the expense of other aspects of the game. Football is still a passing game, but the creative dribbler helps set up play for an attempt at goal. In many cases, a possession that leads to a shot has a component of dribbling and the more players capable of taking on an opponent, the more dangerous will be that team. Speed is a valuable trait that coaches desire as games are often decided from explosive runs; the remaining fitness traits can be manipulated by sport-specific training. There are many tactical similarities between the men's and women's game, but common deficiencies in the women's game (such as poor skill by defenders) have led to specific tactics to exploit such limitations which could be lessened with improved skill. But in the end, despite the technical, tactical and physical differences in men's and women's game ... football is football.

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REFERENCES

- 1 Reilly TR, Thomas V. A motion analysis of work-rate in different positional roles in professional football. *J Hum Movement Stud* 1976;**2**:87–97.
- 2 Reep C, Benjamin B. Skill and chance in association football. *J Royal Stat Soc Series A* 1968;**131**:581–5.
- 3 Mohr M, Krstrup P, Bangsbo J. Match performance of high-standard soccer players with special reference to development of fatigue. *J Sports Sci* 2003;**21**:439–49.
- 4 Kirkendall DT. The nature of the game. In: Dvorak J, Kirkendall DT, eds. *International football and sports medicine: caring for the soccer athlete worldwide*. Rosemont, IL: American Orthopaedic Society for Sports Medicine, 2005:27–36.
- 5 Giulianotti R. Scoring away from home: a statistical study of Scotland football fans at international matches in Romania and Sweden. *Int Rev Social Sport* 1994;**29**:191–200.
- 6 Krstrup P, Andersson H, Mohr M, et al. Match activities and fatigue development of elite female soccer players at different levels of competition. Presented at the Vth World Congress on Science and Football, Antalya, Turkey, January, 2007.
- 7 Krstrup P, Mohr M, Ellingsgaard H, et al. Physical demands during an elite female soccer game: importance of training status. *Med Sci Sports Exerc* 2005;**37**:1242–8.
- 8 Lanham N. Figures do not cease to exist because they are not counted. In: Reilly T, Clarys J, Stibbe A, eds. *Science and football II*. London: E&FN Spon, 1992:180–5.
- 9 Brewer J, Davies JA. The female player. In: Ekblom B, eds. *Football (Soccer)*. Oxford: Blackwell, 1994:95–9.
- 10 Davies JA, Brewer J. Applied physiology of female soccer players. *Sports Med* 1993;**16**:180–9.
- 11 Jensen K, Larsson B. Variations in physical capacity among the Danish national soccer team for women during a period of supplemental training. *J Sports Sci* 1992;**10**:144–5.
- 12 Polman R, Walsh D, Bloomfield J, et al. Effective conditioning of female soccer players. *J Sports Sci* 2004;**22**:191–203.
- 13 Ekstrand J, Walden M, Hagglund M. A congested football calendar and the wellbeing of players: correlation between match exposure of European footballers before the World Cup 2002 and their injuries and performance during that World Cup. *Br J Sports Med* 2004;**38**:493–7.