A comparison of the physiological profiles of elite Gaelic footballers, hurlers, and soccer players

M C McIntyre

Background: Gaelic football, soccer, and hurling are prominent field games in Ireland and involve participants undertaking a variety of playing tasks and skills which place various physiological demands on the participants. The aim of this study was to evaluate and compare the mid-season physiological profiles of elite players.

Methods: Physiological assessment was conducted on 29 inter-county Gaelic footballers, 30 inter-county hurlers, and 21 League of Ireland soccer players.

Results: Significant differences were reported for % body fat (p<0.05), aerobic capacity (p<0.05), flexibility (p<0.05), upper body strength (p<0.05), upper body strength endurance (p<0.05), abdominal endurance (p<0.05), and speed endurance (p<0.05), while there were no differences recorded for height, weight, or speed levels. A relatively heterogeneous body size is evident for all three sports. Soccer players had lower body fat levels, greater aerobic capacity, greater strength endurance, and greater flexibility compared to both Gaelic footballers and hurlers, possibly due to specific training and conditioning programmes or physical adaptation to match play. The greater strength of both Gaelic footballers and hurlers and the superior speed endurance levels of Gaelic footballers also reflect the physical nature of the sports. Similar speed levels amongst all three sports reflect the importance of speed for performance.

Conclusions: The various physiological attributes for Gaelic football, soccer, and hurling reflect the physical requirements for success and participation in each of these field games.

METHODS

Subjects were 29 inter-county Gaelic footballers, 30 inter-county hurlers, and 21 League of Ireland soccer players. Physiological assessment was conducted in the middle of each playing year for each of the field games.

Prior to physiological assessment each subject successfully completed a thorough health risk screening process without any clinically significant findings.

Height was measured to the nearest 0.1 cm using a stadiometer, while body mass was measured to the nearest 0.1 kg using analogue scales (Seca, Hamburg, Germany). Percentage body fat was estimated by skinfold callipers using the four site method as outlined by Durnin and Wormersley. Maximal oxygen intake was estimated from a progressive 20 m shuttle run. Flexibility was measured via the sit and reach test and straight leg raise. The sit and reach test was conducted using a sit and reach box (Cranlea, Birmingham, UK), three trials were performed, and the maximum result recorded. Straight leg raise was measured with a Leighton Flexometer (Cranlea) using the method as outlined by Leighton. Upper body strength was measured via a 1 rep max (the maximum load that a person can lift only once) as outlined by Logan et al and both absolute and relative scores were recorded. Abdominal and upper body endurance was assessed via a 1 min sit up and press up test. Speed endurance was measured via six 30 s maximal shuttle runs over 5, 10, 15, 20, 25, and 30 m interspersed with 30 s intervals for recovery. The total distance covered over the six runs was recorded for each subject. Speed was measured with a set of electronic timers (Pacesetter, Belfast, UK) over a distance of 0–15 m. This test was performed from a standing start, three trials were performed, and the fastest time recorded.

The results were analysed using standard descriptive statistics, while analysis of variance (ANOVA) was used to examine between group variability.

RESULTS

There were no significant differences found for age, height, or weight between players of the three games (table 1). Soccer players were found to posses significantly lower levels of body fat (p<0.05) in comparison to both hurlers and footballers. Footballers were also found to have significantly lower body fat levels compared to hurlers (p<0.05). Soccer players had significantly greater VO2 max values than both...
endurance levels than both hurlers (p < 0.05), while they also had greater hamstring flexibility in the straight leg raise than footballers, while hurlers also had greater hamstring flexibility than footballers (p < 0.05). Gaelic footballers had greater levels of strength during the 1 rep max than both hurlers and soccer players (p < 0.05), while soccer players had greater 1 rep max values than hurlers (p < 0.05). Soccer players had greater upper (p < 0.05) and abdominal endurance (p < 0.05) in comparison to both hurlers and footballers. Footballers were found to have greater speed endurance levels than both hurlers (p < 0.05) and soccer players (p < 0.05), while soccer players (p < 0.05) had significantly greater speed endurance than hurlers. There was no difference in sprint times between any of the groups.

**DISCUSSION**

The age profiles of all teams were very similar. The age profiles of both the football and hurling teams were similar to mean (SD) values reported in the literature to range from 23.5 (4.9) to 26.8 (3.9) years for inter-county Gaelic footballers, while the League of Ireland soccer team had a profile similar to that of an English third division club (25.8 (4.7) years) but slightly higher than an English Premier League club (22.5 (3.6) years).

There were no differences reported for body mass between players of the three games. The values were similar to those reported for inter-county Gaelic footballers (79.9 (8.2) to 82.6 (4.8) kg), Australian Rules players (81.1 (0.07) kg), Rugby Union forwards (83.1 (0.06) kg), and English Premier League soccer players (77.7 (7.6) kg).

Likewise, there was no difference in stature between any of the players. Gaelic footballers have previously been reported to range in stature from 1.79 (0.07) to 1.83 (0.05) m, professional soccer players from 1.75 to 1.83 m. These values are slightly lower than the reported values of 1.9 and 1.81 (0.07) m for Australian rules players and American footballers. The ranges in the current study reflect relatively heterogeneous body size. It is worth noting that inter-county Gaelic football teams have been found to be taller and heavier compared to club players.

Soccer players were found to have significantly lower body fat levels than both Gaelic footballers and hurlers. The values reported here are similar to values previously reported in the literature. The percentage body fat of soccer players has previously been found to range between 9.8 and 10.7% for a number of studies reporting on full time soccer players both at club and international level, whilst differences between semi-professional and professional soccer players have also been reported by Brewer and Davis. In comparison, values reported for Gaelic football are slightly higher, ranging between 11 and 15%. Gaelic football matches are 70 min in duration, therefore the energy demands on the player may be not as great as in soccer where match play is 90 min in duration. Furthermore, soccer players are full time professionals and the greater frequency of training and competition may be responsible for this difference, given that prolonged and long term levels of exercise in training and competition also reduce stored body fat. Interestingly, footballers had lower body fat than hurlers, but it is unclear why this is.

The difference in the aerobic capacities of soccer players and Gaelic footballers and hurlers indicates a greater level of aerobic conditioning in soccer. This trend of soccer players possessing greater estimated VO2max values than both Gaelic footballers and hurlers is evident through the range of values reported in the literature. Values for elite soccer players have been reported to range between 55 and 70 ml kg⁻¹ min⁻¹, while estimated VO2max values for Gaelic football have ranged between 53.8 (3.8) and 58.6 (3.8) ml kg⁻¹ min⁻¹. Therefore, it would seem there is a greater reliance on aerobic metabolism in soccer. However, the physiological strain of match play in soccer and Gaelic football has been estimated to be 70% and 72% of maximum oxygen uptake. As both sports exhibit similar physiological stress during competition, it would seem that better aerobic conditioning in soccer is responsible for this difference in aerobic capacity, particularly since in Gaelic football mean heart rate has been found to exceed 160 beats min⁻¹ for 43% of match play but only 26% of training time. This suggests that training in Gaelic football and hurling is inadequate to induce significant improvement in VO2max; however, more research is required.

Dunbar and Power investigated the flexibility of semi-professional and professional soccer players and found no differences between the groups; the lack of flexibility was attributed to the fact that flexibility is not usually viewed as an important component of fitness for soccer. However, the values reported here exceed those reported by Dunbar and Power and are more similar to values (31 cm) reported by Chin et al. for a professional soccer team in Hong Kong. The differences in sit and reach flexibility found in the present study indicate a greater level of flexibility in soccer players compared to Gaelic footballers and hurlers. It is unclear if this is due to a response to specific training and conditioning programmes or to physical adaptation to match play. However, Gaelic footballers had lower levels of hamstring flexibility during the straight leg raise in comparison to both soccer players and hurlers. Graham-Smith and Lees investigated the risk of hamstring injury while taking a place kick in Rugby Union. They reported that an additional stretch of 10.9% was placed on the biceps femoris muscle in comparison to a maximal assisted stretch, thus placing the hamstrings at greater risk of injury. While the kicking action in Gaelic football is not identical to Rugby Union place kicking, it must also place the hamstrings at increased risk of injury. Overdevelopment of the psoas muscle can very often occur in kicking sports and places extra strain on the hamstrings and may help explain the lack of hamstring flexibility among Gaelic footballers. A comparison of lower back posture between the three groups would be beneficial as poor hamstring flexibility is also related to lower back posture.

Gaelic footballers had superior upper body strength as expected in a sport which requires upper body strength in resisting and instigating physical challenges, both in terms of ball retention and winning possession. This is evident in the upper body strength of the footballers during the 1 rep max. In soccer the physical challenges are not as robust and there is more an emphasis on skill levels when attempting to retain
What is already known on this topic

Gaelic football, soccer, and hurling are prominent field games in Ireland and place various physiological demands on participants.

What this study adds

The various physiological attributes for Gaelic football, soccer, and hurling reflect the physical requirements for success and participation in each of these field games.

REFERENCES